



**U.S. Army Research Institute
for the Behavioral and Social Sciences**

Research Report 1818

**Multi-Echelon Distributed Army Leaders' Information Support
Training (Medalist): Prototype Development And
Recommendations For Future Research**

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January 2004

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Training Technology

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FOREWORD

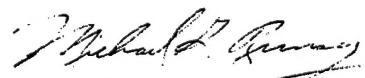
U.S. Army transformation doctrine is increasing the emphasis on dispersed operations and future operations will be conducted by command groups that plan, execute, and train in a dispersed manner. Despite the increased dispersion, future information technologies promise to enable greater coordination within and across echelons. The technologies include digital communication systems and information networks that support a common relevant operating picture, a network-centric environment, reach, and knowledge management, all of which enable efficient information dissemination.

In order to meet the training requirements brought on by the increased complexity of command and control systems, future training must become more effective and efficient. Distributed team training exercises and drills should focus training on the exact people necessary for the competencies being trained and leverage highly effective training techniques such as repetition, immediate feedback, and focused coaching.

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), as part of Work Package (211) FUTURETRAIN: Techniques and Tools for Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Training of Future Brigade Combat Team Commanders and Staffs, and in support of its Science and Technology Objective: IV.SP.2002.02, "*Methods and Measures of Commander-Centric Training*," is developing a variety of new training methods to enhance the Army's ability to develop the capable leaders required for future missions. As a part of this effort, ARI is assessing methods and techniques for measuring and training future command and staff C4ISR tasks. This objective represents a Top 5 Milestone for ARI.

The present effort developed an approach for training small teams engaged in battle command with a focus on the communication skills essential for command and control. The approach trains these elements of battle command in a distributed, multi-echelon environment and incorporates key elements of structured training and deliberate practice, providing coaching and immediate feedback to the training audience. The approach was designed to be generic, adaptable, and scalable to meet dynamic needs. Such training provides a low-cost method for teaching teams to "push" the information needed in specific situations enabling Soldiers to "see and think like a team."

The training approach developed during this effort was used during May and June 2003 at the U.S. Army Armor School by captains in the Armor Captain's Career Course and lieutenants from the Armor Officer's Basic Course. The approach was briefed in June 2003 to the Commander of the 16th Cavalry Regiment; the Commander of the 3rd Squadron, 16th Cavalry Regiment; and the U.S. Army Armor Center instructor cadre from the 2nd and 3rd Squadrons, 16th Cavalry Regiment.



MICHAEL G. RUMSEY
Acting Technical Director

MULTI-ECHELON DISTRIBUTED ARMY LEADERS' INFORMATION SUPPORT TRAINING (MEDALIST): PROTOTYPE DEVELOPMENT AND RECOMMENDATIONS FOR FUTURE RESEARCH

EXECUTIVE SUMMARY

Research Requirement:

To meet the challenges of the 21st century, the U.S. Army has dedicated itself to attaining a vast, strategic transformation. The transformation is proceeding expeditiously with the establishment of a Stryker Brigade Combat Team and will ultimately lead to the fielding of the Future Force, its Future Combat System of Systems, and all the training required to bring that Force to proficiency.

As the Army approaches this objective, the emerging operational and training environments are presenting significant training and leader development challenges. The operational environment projects an increase in dispersed operations. Thus, one challenge is to train force proficiency in decentralized command and control under dispersed operating conditions. The training environment, influenced by the operational environment and the projected availability of expert trainers, forecasts a broader requirement for distributed training. A second challenge, thus, is to expedite effective training when and where training needs arise, even though trainee and trainer personnel may be separated by great distances.

The recently completed Multi-Echelon Distributed Army Leaders' Information Support Training (MEDALIST) project, conceived and sponsored by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) Armored Forces Research Unit at Fort Knox, KY, had two primary areas of focus: the identification of communication requirements associated with decentralized command and control in dispersed operations, and the development of an approach for training those and related tasks in a distributed manner.

Procedure:

The project began with the identification of selected requirements for training small teams of leaders on communicating in a dispersed and decentralized battle command environment. To identify these requirements, project staff examined the functions of battle command and identified the basic communication activities that occur therein. An additional literature review resulted in the production of a set of general guidelines for communicating effectively in a dispersed and decentralized command environment. Together, the communication activities and guidelines represent a set of training requirements that address certain aspects of the communication that occurs in decentralized battle command under dispersed operating conditions. The training requirements were used to construct a training objective for the project's prototype exercise developed in accordance with the MEDALIST training approach.

The MEDALIST training approach was designed to meet the requirement for training that is distributed, realistic, efficient, scalable, adaptable, focused, and flexible. The approach is distributed in that it uses a prototype simulation system, the MEDALIST Prototype System, to enable groups of Army commanders, leaders, and trainers who are not co-located to train together. Its distributed feature also provides for a certain realism by allowing participants who *are* co-located to train under simulated dispersed operating conditions (i.e., from different offices or buildings). The approach was also designed to be efficient, scalable, and adaptable in its implementation, promoting an effective use of training time and materials. Efficiency results from the use of the structured training method and deliberate practice training techniques, to include repeated practice and active coaching. Scalability is achieved through a training design that allows various echelons within a unit to train on the same training objective using a single training support package (TSP). Finally, the approach incorporates focus and flexibility by enabling training on a variety of objectives, tasks, and skills associated with decentralized battle command in dispersed operations.

Project staff developed a prototype exercise in order to demonstrate the MEDALIST training requirements and approach. The exercise provides training at the battalion-company level and its audience includes a battalion commander and three company commanders. The training objective for the exercise was developed from the project's findings on effective communication in decentralized battle command in dispersed operations.

The project's evaluation efforts sought to improve the training approach and exercise and to obtain judgments of the approach's potential effectiveness, value, and acceptability to Army users. In the early phases of development, project staff conducted iterative reviews of training concepts and products. Project staff then conducted two types of pilots: internal and external. During the internal pilot, project staff filled all participant positions, including support and training audience. In the five external pilots, Army personnel filled the training audience positions, but project staff again filled the training support roles to allow for the continued refinement of the coaching approach through repeated practice and testing.

Findings:

Pilot feedback resulted in several key and many minor modifications that served to improve the training approach. Most importantly, however, the feedback indicated that the approach has significant potential for future integration into U.S. Army Training and Doctrine Command and U.S. Army Forces Command settings. The most notable finding in this area was that pilot participants representative of the approach's intended audience viewed the program as an effective, efficient, and promising method of training. This was especially true among younger audiences who were more familiar and comfortable with distributed, electronic communication.

Utilization of Findings:

At the project's conclusion, project staff made a number of recommendations related to the conduct of future research and development. Recommendations suggest expanding the focus and application of the training approach, refining the TSP model, refining the performance

measurement component, and evaluating the coaching model. Recommendations also address the identification of future simulation (i.e., One Semi-automated Forces [OneSAF] Objective System [OOS] and OneSAF Testbed Baseline [OTB]) requirements, the integration of the MEDALIST approach into Army training, and the design of training for future forces. Several of these recommendations will be addressed in a MEDALIST follow-on project. Others deserve the attention of related research and development that will design methods for providing effective training for future forces.

MULTI-ECHELON DISTRIBUTED ARMY LEADERS' INFORMATION SUPPORT
TRAINING (MEDALIST): PROTOTYPE DEVELOPMENT AND RECOMMENDATIONS
FOR FUTURE RESEARCH

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MULTI-ECHELON DISTRIBUTED ARMY LEADERS' INFORMATION SUPPORT TRAINING (MEDALIST): PROTOTYPE DEVELOPMENT AND RECOMMENDATIONS FOR FUTURE RESEARCH

Introduction

The U.S. Army's strategic transformation will require changes in all areas from doctrine, training, and leader development to organization, materiel, and Soldiers. The transformation is proceeding expeditiously with the establishment of a Stryker Brigade Combat Team and will ultimately lead to the fielding of the Future Force, its Future Combat System of Systems (FCS), and all the training required to bring that Force to proficiency.

As the Army approaches this objective, the emerging operational and training environments are presenting significant challenges. The operational environment projects an increase in dispersed operations. Thus, one challenge is to train force proficiency in decentralized command and control under dispersed operating conditions. The training environment, influenced by the operational environment and the projected availability of expert trainers, forecasts a broader requirement for distributed training. A second challenge, thus, is to expedite effective training when and where training needs arise, even though trainee and trainer personnel may be separated by great distances.

The recently completed Multi-Echelon Distributed Army Leaders' Information Support Training (MEDALIST) project, conceived and sponsored by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) Armored Forces Research Unit at Fort Knox, KY, had two primary areas of focus: the identification of communication requirements associated with the conduct of decentralized command and control in dispersed operations, and the development of an approach for training those and related tasks in a distributed manner. Key project outcomes included the following products:

- Training requirements that cover the basic communication activities of decentralized battle command in dispersed operations and selected guidelines for executing those activities effectively. Communication activities include tasks such as *directing subordinates* and *reporting information and assessments*. Communication guidelines include requirements such as *ensuring communications are highly interactive*.
- A distributed, small-group training approach that includes techniques for effective distributed coaching and meets the needs of current and future forces.
- A prototype training exercise and training support package (TSP) that demonstrate the training requirements and approach.

This ARI report serves as the final account of the MEDALIST project. It describes the research and development (R&D) that influenced project planning and execution, documents the outcomes listed above, and presents recommendations for the continued development of MEDALIST and future forces training.

Background

The MEDALIST project was initiated based on the premise that conducting battle command and delivering training will be as difficult and critical as ever in the emerging operational and training environments. This premise was established through research that explored the conditions of those environments and identified a list of relevant training needs. In response to those needs, project designers explored the potential utility of two proven training methods that remain underutilized in Army training: structured training and deliberate practice. The final project objectives reflect the findings of this research.

The Operational Environment and Battle Command

The operational environment is one of the prime determinants of Army training requirements, including those specific to the execution of battle command. Currently, operational conditions are defined along a number of dimensions that include threat, operations, information, and technology (Department of the Army [DA], 2001b). These conditions affect the conduct of military operations by *forcing* and *enabling* the dispersion of command and control nodes throughout a unit's area of operations. Thus, forces are more broadly distributed across the battlefield, and a greater need exists for decentralized command and control that allows units to take greater advantage of opportunities. This, in turn, raises the requirement for training that addresses decentralized command in dispersed operations, including the communication that occurs therein.

Force dispersion results primarily from conditions in the areas of *threat* and *operations*. Threat conditions specify that multiple threats, both from national powers and from transnational groups, will confront U.S. interests. These adversaries will employ tactics that take advantage of perceived U.S. doctrinal weaknesses and adapt to our tactics, techniques, and procedures. Their tactics will be seen in nonlinear, asymmetric operations that employ regular military, paramilitary, and terrorist or criminal organizations conducting such dissimilar activities as cross-border attacks, coercion, illegal drug trading, terrorism, illicit arms trafficking, or piracy. These operations will occur throughout the area of operation to bring about dispersion of U.S. forces and dissolution of effort.

As these threats arise, U.S. force operations must enable local commanders to detect and react to the asymmetric and adaptive threat more quickly than has previously been required. The types of operations conducted by U.S. forces will increase in number, and the operations themselves will require rapid changes in mission as well as the dispersion of forces across the battlefield in a tactically sound manner. This will elicit a decentralized model of command and control, practiced under dispersed operating conditions, that relies heavily on timely, effective communication.

Conditions in the *technology* and *information* dimensions are key enablers of effective force dispersion, as they have the potential to enhance the communication that occurs in that environment. Advances in these dimensions include the development of digital communication systems and information networks. These command and control systems and network assets have the capacity to improve unit performance by enabling units to operate in a dispersed

manner while maintaining a common operating picture (COP). They support communication within units and teams of commanders, but they also provide access to external reach intelligence sources that have previously been unavailable to personnel on the battlefield. These sources include, but are not limited to, distant cells that can provide intelligence and lessons about how to interpret unique situations on the battlefield. As command and control systems and information networks are fielded, commanders should be able to acquire, share, and use information more effectively, thereby increasing unit performance in dispersed operations. If used to their full advantage, these assets will enhance the effectiveness of decentralized command in dispersed operations, enabling units to react without delay to the quick-paced events of the dynamic operating environment.

In exercising battle command, commanders must visualize, describe, and direct their missions and forces (DA, 2001a). Among other requirements, this involves assessing risk, assigning missions, prioritizing and allocating resources, understanding subordinate needs, and deciding when and how to make adjustments. In exercising *decentralized* battle command, a commander's requirements are expanded to include a greater emphasis on enabling subordinates to make decisions instantaneously, within their commander's intent, in order to take advantage of tactical opportunities. This requires a commander whose command mode is decentralized as well as subordinate commanders who understand the extent to which command has been decentralized. Their understanding influences their duties, responsibilities, and freedom to act. Decentralized command also requires subordinate commanders who can articulate situations and recommendations in a manner their commander has come to expect and in a dispersed environment where communication becomes more critical, but also more difficult. Together, these conditions raise the need for training decentralized battle command under dispersed operating conditions, with a focus on communication. Furthermore, this type of training must be distributable anytime, anywhere.

The Training Environment and the Delivery of Training

Providing the right training to the right personnel at the right times will become increasingly important as the Army moves toward its Future Force model that not only incorporates, but (also) leverages the conduct of dispersed operations. Training design and delivery, thus, must take full account of the conditions under which training will be executed. These conditions represent the training environment.

Some training conditions stem directly from the operational environment. As mentioned earlier, the operational environment will present a greater frequency of dispersed operations in which commanders, who are scattered across greater distances, must retain their ability to execute an increasing number of separate but interdependent tasks. Additionally, effective communication involving the use of command and control and other information assets will be critical to the successful exercise of battle command in this setting. All these conditions affect the training environment by magnifying the importance of efficient training. First, force dispersion translates into a requirement for distributed training that can be conducted anywhere (e.g., in theater) and can present realistically the dispersed conditions of the operating environment in training at Army installations. Second, an increased number of mission types

and a broader requirement for proficiency with command and control and information assets will constrain the time allocated to any one training agenda. Therefore, training must be efficient.

A final condition relates to the availability of training resources, specifically, trainers. Trainers who are experts in their fields and the most qualified to facilitate training will likely be located as far away as the continental U.S. and often at U.S. Army Training and Doctrine Command (TRADOC) installations. This too indicates that the best-designed training will include a distributed feature that allows deployed forces to access trainers located in the U.S. and non-deployed forces to access trainers located at TRADOC installations.

Summary of Training Needs

The training needs described so far can be summarized in terms of the topics that training should address and the means by which that training should be conducted. The topic—communication in decentralized battle command in dispersed operations—is an area in which skills may not be so easily acquired. Soldiers arrive equipped with communication and command styles and techniques, some of which must be extinguished and some of which must be refined in order to facilitate effective communication within the team. This cannot be attained through individual training alone, and it is not often the focus of large-scale field training exercises. Instead, it requires small team training that focuses specifically on communication. Further, it cannot be trained only on occasion, but must be trained frequently and efficiently and not to the exclusion of other training requirements. Thus, there exists a requirement for training that is:

- *focused*, addressing communication skills that support the conduct of decentralized battle command in dispersed operations;
- *flexible*, enabling a focus on other Army leader tasks;
- *distributed*, bringing people together in a virtual (i.e., distributed) team setting;
- *realistic*, reflecting the conditions of the dispersed operating environment;
- *efficient*, making the most of time spent by providing as much practice and feedback as possible;
- *adaptable*, allowing training to be conducted until proficiency is achieved; and
- *scalable*, enabling units from brigade through platoon to train on the same objective and mission.

Training Methods

Designing a training approach that meets the identified training needs requires a careful application of appropriate training methods. Over the past decade, ARI has directed considerable attention toward the application of two such methods: structured training and deliberate practice.

Structured training is the intentional design of training events so that trainees perform tasks in a predetermined sequence, receive frequent and specific performance feedback, and

accomplish training objectives (Campbell, Quinkert, & Burnside, 2000). It focuses on task execution, but is often conducted in the context of a larger mission, where mission outcomes that are indirect and loose measures of task performance may distract from the more direct measurement of the tasks being trained. Even so, in numerous applications (Hoffman, Graves, Koger, Flynn, & Sever, 1995; Pratt et al., 2000) it has shown a considerable capacity to help participants improve their performance, identify areas where further improvement must be accomplished, and achieve further improvement in follow-up training.

Deliberate practice is the forced repetition of task performance combined with the provision of cues, or performance coaching, on ways to improve that performance (Ericsson, Krampe, & Tesch-Römer, 1993). In this type of training, trainees perform tasks repeatedly until they achieve criterion performance or noted improvement. Through active coaching, the training raises performance levels to standard during the training instead of simply identifying areas in which performance should be sustained or improved. The deliberate practice method of training is executed under drill-like conditions and removes task performance from the context of the larger mission or game. This leads to an emphasis on performance technique over performance outcome, which is often influenced by factors other than strict technique and may redirect the intended focus of the training. Finally, deliberate practice is an intentional, disciplined activity. It is not designed for enjoyment, although participants may gain some motivation as a result of getting the opportunity to interact with or perform for an expert trainer (Ericsson, 1996).

Deliberate practice has been used over the years to train motor skills as well as cognitive tasks. Examples from the military setting where the deliberate practice method has been used to train cognitive skills include TRADOC's *Adaptive Thinking Leaders' Guide* and ARI's *Think Like a Commander* training program (Shadrick & Lussier, 2002).

As alluded to earlier, the extensive training requirements placed on Army leaders restrict the opportunities for those leaders to train on any one task or set of tasks, especially in a team context. Because of their time-saving features (i.e., an emphasis on focus, the frequent repetition and coaching of performance, and the provision of opportunities to address task performance independently from mission outcome), both the structured training method and the deliberate practice method should be incorporated into any training that intends to address the communication component of battle command. The MEDALIST project, thus, included a requirement to do just that.

Project Objectives

The MEDALIST project had four objectives that defined the focus and scope of the effort:

- *Objective 1.* Identify a set of small team training requirements associated with effective communication in decentralized battle command in dispersed operations.
- *Objective 2.* Design and develop a multi-echelon, distributed training approach and a sample prototype exercise based on the approach.
- *Objective 3.* Evaluate the training requirements, approach, and exercise through pilot implementation.

- *Objective 4.* Prepare an ARI research report that describes the project's literature reviews, development, and recommendations and an ARI research product¹ that contains all the training materials and software needed to run the prototype exercise.

The remainder of this report addresses the efforts and outcomes associated with the project's first three objectives.

Training Requirements

The project's first objective stipulated the identification of the requirements for training small teams of leaders on communicating in a dispersed and decentralized battle command environment. To identify these requirements, project staff first examined the functions of battle command and identified the basic communication activities that occur therein. An additional literature review was then conducted to develop a set of general guidelines for communicating effectively in decentralized battle command under dispersed operating conditions. The training requirements identified were later used to construct a training objective for the project's prototype exercise.

Battle Command Communication Activities

To identify the basic communication activities that occur in the context of battle command, project military subject matter experts analyzed the three functions of battle command: visualize, describe, and direct (DA, 2001a). The analysis identified the various situations in which information is exchanged and the activities of commanders in those situations. Due to the project's focus on training that involves only two echelons of leaders and the use of higher intelligence (i.e., reach) sources, project staff identified only those activities that occur between a senior commander and his immediate subordinate commanders, as well as the senior commander's communication with higher intelligence sources.

During the project, analysts identified communication activities only at the battalion-company level. It was expected that these would generalize well to other echelons, even given the differences in commander responsibilities at different echelons and echelon-specific terminology. Figure 1 presents the base set of battle command communication activities, or requirements.

Communication Guidelines

It is widely accepted that frequent interaction in educational settings produces improved learning opportunities (Bloom, 1981; Daly, Friedrich, & Vangelisti, 1990). In one study (Jones, 1996), researchers collected student reactions to seven interactive telecourses. Students participated from distributed classrooms that were connected by video cameras and microphones using telephone lines. Feedback suggests that students prefer courses in which instructors use more interactive strategies, that is, when instructors keep students involved with timely and consistent responses to their needs. Similarly, Marshall (2001) reviewed the literature on communication in the classroom and concluded that the distance education environment should

¹ See Graves et al., (in preparation).

reflect the regular classroom, especially in the area of instructor-student interaction. Finally, Bing and Laroche (2002), in their suggestions for achieving high-functioning virtual teams, assert that team leaders should ask for input from each member of the team, ensuring the participation of the entire team.

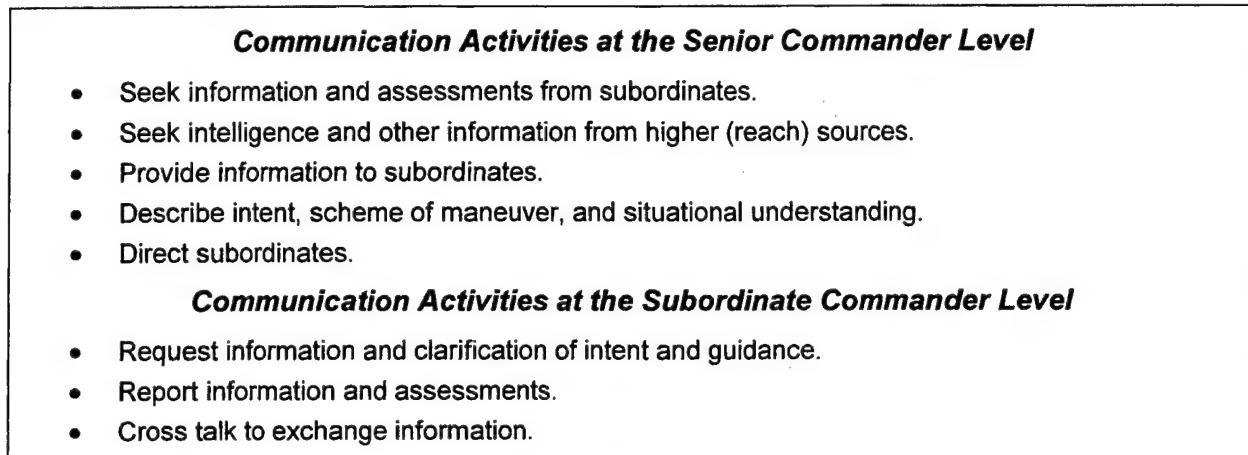


Figure 1. Basic communication activities of battle command.

Part of the difficulty of maintaining an interactive atmosphere when facilitating virtual learning teams, is that it is easy for participants to disengage, especially when disagreements arise (Johnson, Berrett, Sumya, Yoon, & La Fleur, 2001). In response to these situations, these researchers suggest that leaders should monitor discussions, keeping an eye out for conflict, and then resolve that conflict outside the framework of the group discussion. This may require speaking one-on-one with those involved in the conflict. To further reduce conflict and increase participation, Bing (2001) and Willis (1992) suggest that leaders must maintain a high level of trust among group members, because separation by distance has a negative effect on rapport.

Several specific communication techniques are likely to improve the effective functioning of virtual teams operating in a distance mode. First, Bing and Laroche (2002) suggest that participants in distance discussions should identify themselves prior to speaking. Second, Willis (1992) asserts that distance discussion participants should use concise, cohesive statements and direct questions in order to reduce response time. Third, Bailey and Luetkehans (1998), in presenting tips for facilitating virtual teams, suggest that discussion leaders should use open-ended questions when attempting to build on prior concepts. Together, these techniques, conditions, and requirements represent various criteria for effective distance communication. The guidance, however, does not address extensively the unique communication requirements of leaders (e.g., battle commanders). Subsequent reviews, therefore, examined the communication requirements linked to leadership.

In addressing the leadership component, project staff focused on J. A. Olmstead's most recent work (Olmstead, 2002), which provided the following suggestions:

- Individuals at information control points must evaluate and pass along information, all the time remaining aware of the problems associated with *selective emphasis* and *selective omission*, in order to avoid the reporting of inaccurate or incomplete

information. Selective emphasis occurs when an individual receives a message and stresses the aspects of that message that are most important to him when he passes the message along. Those aspects stressed may not be those intended by the original sender. Selective omission occurs when an individual does not pass along all elements of a communication; this may occur when persons avoid passing along information that reflects unfavorably on them.

- In downward communication, subordinates may second-guess superiors or expand inappropriately on instructions, carrying actions further than was intended. Furthermore, sensitivity to power may prohibit subordinates from obtaining clarification.
- Supervisors may withhold key information in order to maintain control of the operation. This keeps subordinates from having all the information they need to perform effectively.
- When seeking information, the need-to-know is generally less than the desire-to-know.
- A climate of trust facilitates effective communication; it helps subordinates perceive their superior as an aid rather than as a threat.
- Communication is ineffective many times when an individual does not realize the relevance of the information he possesses, and, thus, does not pass it on.
- Leaders can increase communication effectiveness by using standing procedures and directives and by establishing a conducive climate and positive relationships.
- Leaders can attack the causes of poor communication—changing organizational practices and climate—in part, by maximizing contact.
- Leaders should assure subordinates that they are trusted by limiting the extent to which they check on subordinate activities and by using words for information purposes rather than to influence behavior.

These findings were used to develop a set of guidelines for communicating effectively in a dispersed and decentralized command setting. The guidelines contain inferences into how communication should be conducted based on the findings described above. The guidelines also translate findings from the various domains into a military command context and are organized under the following topics: key and relevant information, open communication, involvement, and communication techniques, as shown in Figure 2.

Key and Relevant Information

Commanders should pass along *all* key and relevant information.
Commanders should pass along only information that is relevant.
Commanders should ensure their communications place emphasis on key information.
Commanders should not withhold information to maintain control of the operation.
Commanders should seek only the information they need to know.

Open Communication

Commanders should encourage subordinates to request clarification of intent and directives.
Commanders should establish themselves as an aid, not a threat, to facilitate open communication.
Commanders should maintain a high level of trust.
Commanders should use their communications for information rather than influence.
Commanders should allow subordinates to take initiative, thereby demonstrating trust in those subordinates.

Involvement

Commanders should maintain contact with subordinates.
Commanders should ensure their communications are highly interactive.
Commanders should request the input of subordinates.
Commanders should monitor and resolve conflicts to ensure participants remain engaged in discussions.

Communication Techniques

Communications should be short, concise, and direct.
Open-ended questions should be used for obtaining additional critical information.
Commanders should require the use of standing operating procedures for communications.

Figure 2. Guidelines for communicating in decentralized battle command in dispersed operations.

The communication activities and guidelines represent a set of training requirements that address certain aspects of the communication that occurs in decentralized battle command in dispersed operations. The activities indicate what types of communications will occur, and the guidelines specify techniques for ensuring communication is effective. Together, they target communication style, technique, and effectiveness, especially as related to the interaction that occurs within teams.

Because a person's ability to communicate skillfully is typically a sensitive subject, any training that addresses the guidelines identified should be conducted under the condition of trust and a mutual agreement that the intended outcome is performance improvement and not critical personal evaluation. No less important, trainers in this area must ensure their feedback and instruction drives down past the "safer" topics of tactics, decision-making, and situational understanding, into the inner-workings or mechanics of performance that *enable* effective tactics, decision-making, and situational understanding. Those mechanics are communications and communication criteria, such as those identified as targeted performance topics in Figure 3.

SAFE	Tactics
	Decision-making
	Situational understanding
TARGET	Seeking and providing information
	Directing subordinates
	Communicating effectively (e.g., clearly)
	Establishing an open communication environment

Figure 3. Examples of safe and target performance topics.

With these training requirements (i.e., activities and guidelines) in hand, project staff began developing an approach suitable for training these and related requirements.

The Training Approach

The MEDALIST training approach was designed to meet the requirement for training that is distributed, realistic, efficient, scalable, adaptable, focused, and flexible, as described earlier in this document. As such, the approach is distributed, enabling groups of Army commanders, leaders, and trainers who are not co-located to train together. Its distributed feature, enabled by the MEDALIST Prototype System ([MPS], described on page 16), also provides for a certain realism by allowing participants who *are* co-located to train under simulated dispersed operating conditions (i.e., from different offices or buildings). The approach is also efficient, scalable, and adaptable in its implementation, promoting an effective use of training time and materials. Efficiency results from the use of the structured training method and deliberate practice training techniques, to include repeated practice and active coaching. Scalability is achieved through a training design that allows various echelons within a unit to train on the same training objective using a single TSP. The exercises are designed to be used repeatedly by the same training audience. Finally, the approach incorporates focus and flexibility by enabling training on a variety of objectives, tasks, and skills associated with decentralized battle command in dispersed operations.

This section describes the MEDALIST training approach in terms of its audience and uses; exercises; material, simulation, and personnel requirements; and implementation. In certain instances, the section presents materials developed for the project's prototype exercise to demonstrate the concepts described.

Audience and Uses of the Approach

The MEDALIST training approach is designed to train the communication tasks required of Army commanders and leaders at all echelons, brigade through platoon. Specifically, the audience of the approach includes brigade commanders, battalion commanders, company commanders, and platoon leaders who train in the following combinations:

- a brigade commander and his battalion commanders,
- a battalion commander and his company commanders, and
- a company commander and his platoon leaders.

The approach is intended for use in U.S. Army Forces Command (FORSCOM) and TRADOC settings. In FORSCOM units, the approach should be used to build proficient intact battle command teams in situations where teams are composed of personnel who have the military education level and professional experience that qualify them for the slots they are holding. The approach can be used throughout a unit's training calendar, but is particularly appropriate upon the arrival of a new commander or subordinate commander when team proficiency naturally drops. In the TRADOC setting, the focus shifts from building intact teams to acquiring expertise in basic battle command skills. In the TRADOC setting, the approach should be employed to allow future leaders to practice the skills taught in their courses.

Exercises

The MEDALIST training approach provides exercises that support scalable, adaptable training for the selected multi-echelon audiences. Scalable training is training that can be conducted at different echelons (e.g., brigade-battalion, battalion-company). Adaptable training is training that can be conducted multiple times under varied tactical scenario conditions to build proficiency over time.

In the MEDALIST approach, scalability is achieved through the provision of three separate sets of exercises, one set for each echelon combination. All the exercises train the same objective and are contained in a single TSP. Thus, a single TSP provides one exercise set at the brigade-battalion level, another at the battalion-company level, and a third at the company-platoon level. Finally, all three exercise sets are nested in the same division-level tactical scenario: The brigade-battalion exercises are based on one of the division's brigade missions; the battalion-company exercises are based on one of the brigade's battalion missions, and the company-platoon exercises are based on one of the battalion's company missions.

The MEDALIST approach uses multiple exercise versions and scripted scenario branches to address different training needs. The use of multiple exercise versions (i.e., three for each exercise) enables training on the same mission and training objective, but with different tactical conditions, events, and outcomes. A single audience, thus, can conduct an exercise three times, using the three versions, in order to improve its proficiency on the training objective over the course of those executions. In addition, each exercise version contains scenario branches that occur at tactical decision points in the scenario. Through making different tactical decisions, commanders are able to influence the course of a scenario and even change its outcome.

In summary, the MEDALIST training approach stipulates the provision of three exercises, each presented in three versions, for a total of nine exercise versions, as shown in Figure 4. The nine versions provide scalable, adaptable training on an overarching training objective and are contained in a single TSP that describes their support requirements and implementation.

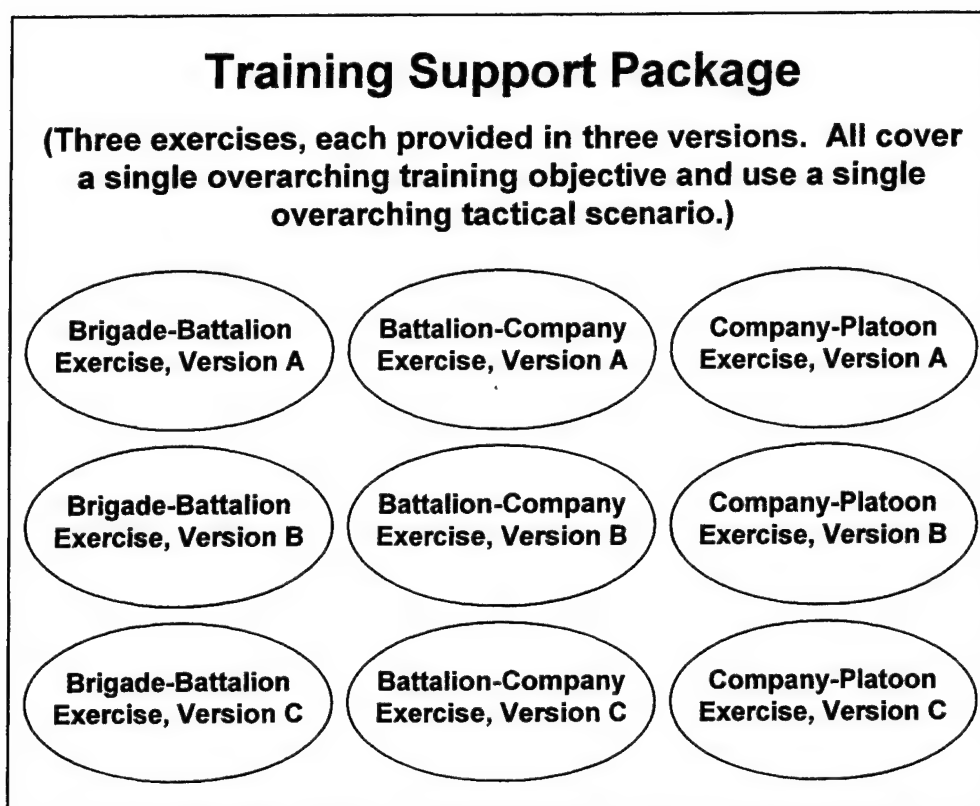


Figure 4. Exercise framework.

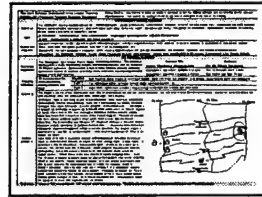
Support Requirements

The MEDALIST training approach requires support in the areas of material, simulation, and personnel. Material support refers to the TSP that contains all the information and guidance needed to execute the training. A sample TSP developed for the project's prototype exercise is provided in Graves et al. (in preparation). Simulation support is provided by the MPS. The MPS establishes the conditions and events of the tactical scenario, provides communication capabilities, and enables the training to be conducted in a distributed manner. Personnel support refers to all trainer and other support personnel who assist in the training, from exercise selection through execution.

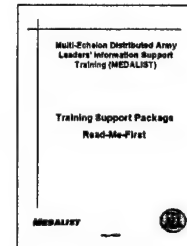
Material Support

Material support for MEDALIST training is provided in TSPs. The TSPs contain components representative of those generated in the Army's previous development of structured training programs (e.g., Hoffman et al., 1995; Graves, Campbell, Deter, & Quinkert, 1997) and identified in Appendix E of TRADOC Regulation 350-70 (DA, 1999). Each MEDALIST TSP is designed for a specific unit type, mission, and training objective. The TSPs contain five component types, including an exercise thumbnail, a read-me-first document, training guides, simulation files, and exercise attachments, as shown in Figure 5.

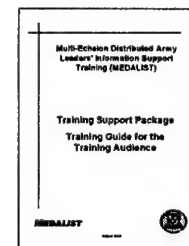
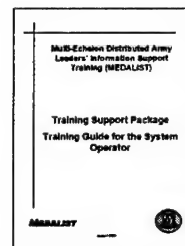
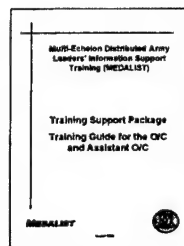
**Exercise
Thumbnail**
(1 per training
support package)



Read-Me-First
(1 per training support
package)



Training Guides
(3, one for each
participant type)



Simulation Files
(9, one for each exercise
version)

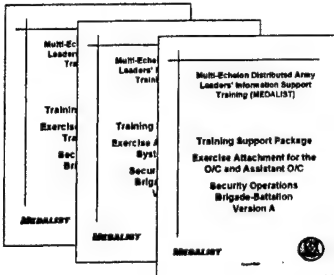


Figure 5. Training support package components and organization.

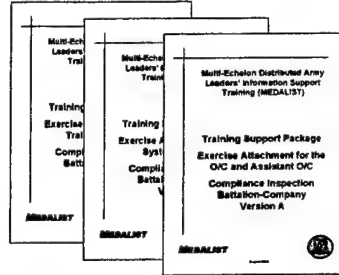
Exercise Attachments

(27, one for each participant type
[3] and exercise version [9])

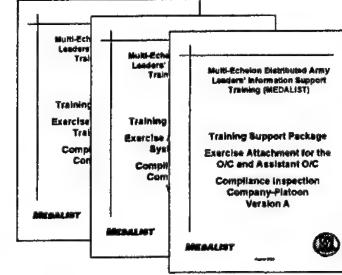
Security Operations Brigade-Battalion Version A



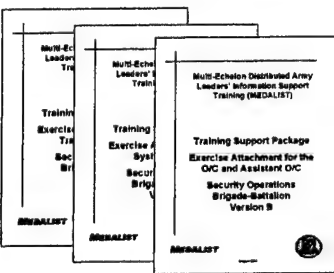
Compliance Inspection Battalion-Company Version A



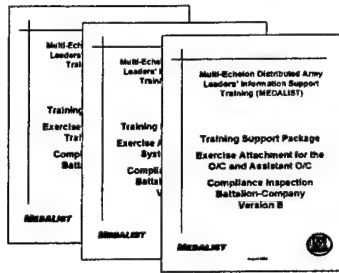
Compliance Inspection Company-Platoon Version A



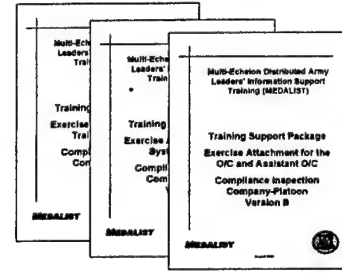
Security Operations Brigade-Battalion Version B



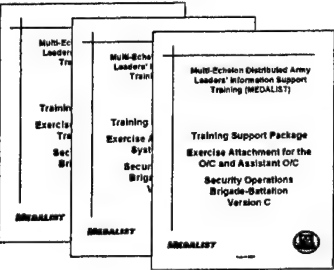
Compliance Inspection Battalion-Company Version B



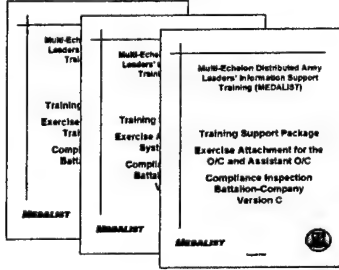
Compliance Inspection Company-Platoon Version B



Security Operations Brigade-Battalion Version C



Compliance Inspection Battalion-Company Version C



Compliance Inspection Company-Platoon Version C

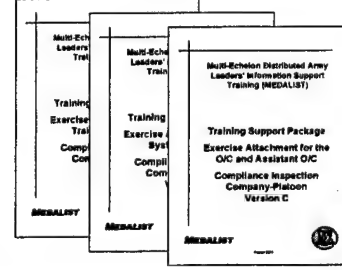


Figure 5 (continued). Training support package components and organization.

The exercise thumbnail was developed to provide all the information that would be needed for a unit leader or trainer to select a MEDALIST TSP. The thumbnail includes information concerning (a) the overall design, intent, and uses of the approach; (b) the training objective and exercises supported by the TSP; (c) the tactical scenario underlying the exercises;

and (d) the resources required to implement the training. In the future, such information will be searchable and will reside in training repositories included in Army training support systems.

The read-me-first document was included in the TSP as a means to launch users into the first steps of planning and preparing for MEDALIST exercises. It contains guidance for the different user types who may select or retrieve the TSP. User types include commanders or trainers who are seeking training for their units and the instructors of TRADOC courses.

The training guides of any given TSP explain how to plan, prepare for, and execute the exercises supported by that TSP. The TSPs provide one training guide for each type of participant, for a total of three guides. Participant types, as described in more detail later, include trainers (i.e., an observer/controller [O/C] and assistant O/C), a simulation operator (i.e., MPS system operator), and training audience personnel. The guides present need-to-know information by participant type and are organized into four sections:

- An *Introduction* orients the reader to the training approach, exercises supported, and TSP and guide contents. It also indicates the first step in planning or preparing for the training, depending on the audience of the guide—only O/C and training audience personnel are involved in exercise planning.
- An *Overview of the Training Approach* section describes the training approach in terms of its (a) defining characteristics, (b) recommended and potential uses, (c) support requirements, (d) exercises, (e) training objective model, (f) execution, (g) coaching model, (h) limitations, and (i) supporting MPS.
- An *Exercises* section presents the individual exercises supported by the package, identifying their audiences, difficulty levels, and focus.
- A *Roles and Tasks* section describes the participants' roles and all the activities required by those participants during the planning of, preparation for, and execution of the training.

The simulation files that are provided in MEDALIST TSPs are database files. Each TSP comes with a set of these files, one file for each exercise version. The files contain all the scripted tactical reports and displays that are used during training to present scenario events.

Individual exercise attachments are designed to support the execution of the various exercise versions supported by a TSP. Each TSP contains twenty-seven exercise attachments, as three attachments (one for each participant type) are provided for each of the nine exercise versions. Exercise attachments contain only information related to the specific exercises and audiences for which they were compiled. Together, attachment contents include (a) the exercise title and version, (b) an exercise overview, (c) a training objective, (d) an exercise coaching guide, (e) a scenario storyboard, (f) a scenario decision tree, (g) an operations order, (h) an intelligence summary, and (i) rules of engagement. These contents, as contained in the three types of attachments, by participant type, are presented in Figure 6.

Exercise Attachment for the Observer/Controller (O/C) and Assistant O/C

- The exercise title and version.
- An exercise overview (describes the events and conditions of the tactical scenario).
- A training objective.
- An exercise coaching guide.
- A scenario storyboard (lists all tactical reports and sends times by exercise event).
- A scenario decision-tree (indicates the tactical reports and displays to use based on tactical decisions made during the exercise).
- An operations order extract and overlay.
- An intelligence summary.
- Rules of engagement.

Exercise Attachment for the System Operator

- The exercise title and version.
- A scenario storyboard.
- A scenario decision-tree.

Exercise Attachment for the Training Audience

- The exercise title and version.
- A training objective.
- An operations order extract and overlay.
- An intelligence summary.
- Rules of engagement.

Figure 6. Exercise attachment contents by attachment type.

Simulation Support

All MEDALIST training is driven by a prototype constructive simulation system that runs on a set of personal computers networked via Internet or intranet. The system, called the MPS, was developed specifically for the MEDALIST project in order to support a limited implementation of the project's prototype exercise². The MPS creates the training environment by presenting tactical reports, displays, and overlays to the training audience and by providing various means of communication among exercise participants. This section provides an operational overview of the MPS.

Using the MPS, training support personnel depict battlefield events by sending tactical reports and displays to the training audience. Reports represent messages from notional subordinate and higher tactical elements. Displays are used to provide the digitally constructed COP, which under operational conditions is generated by Army battle command and control systems, such as the Force XXI Battle Command for Brigade and Below (FBCB2). The MPS is also used to support the tactical interaction that occurs among training audience members and the training support communication required for exercise control and performance coaching.

² The current MPS is intended for research purposes only and satisfies the minimum requirements for MEDALIST training support. Project findings, however, indicate that an enhanced version of the system may represent a viable tool for supporting near-term training needs, especially in the TRADOC setting.

The MPS was intended to represent, but not necessarily replicate, the functions of the Army's operational communication systems. Functions represented include (a) an FM voice communication function, (b) a written reporting function, (c) an instant messaging function, (d) a tactical display function, and (e) a tactical overlay function.

- The *FM function* supports all voice communication, both tactical and training support that occurs during MEDALIST training. The MPS provides one channel that represents, in its tactical application, the training unit's command net. Most last minute preparation and coaching are conducted via this function.
- The *reporting function* serves as the primary means of delivering tactical communications during MEDALIST exercises. Training support personnel use the function to send prepared tactical reports to the training audience to drive the tactical scenario. Support personnel may also use the function to respond to the audience's requests for information from notional higher or subordinate units. The training audience uses the function to forward prepared reports or construct and send new reports as they execute the mission. The reporting function provides pre-formatted report types (e.g., combat reports, logistics reports), as well as free text messages.
- The *instant messaging function* was included to explore the possibility of including like functions in future Army command and control systems. In MEDALIST training, this function is used for tactical as well as training support communication. For instance, the training audience can converse amongst themselves in a running dialogue to attain situational awareness and understanding. Support personnel can use the function to provide coaching to participants or replies to requests for tactical information. Instant messages originating from the O/C, which most frequently contain coaching, are presented in blue font to distinguish them from the audience's tactical communications.
- The *tactical display function* is provided to represent the COP. The system operator (described later) is responsible for populating the COP with prepared tactical displays that present friendly, threat, and other elements, as well as control measures and the terrain on which the mission is being conducted. Participants can click on the tactical display to obtain the grid coordinates of locations they need to include in their reports and messages.
- The *tactical overlay function* represents the means by which overlays are provided and generated. It is supported by an electronic whiteboard feature. The system operator uses the overlay function to send prepared overlays to the training audience. Further, each member of the audience has his own tactical overlay that he can modify prior to or during an exercise. The MPS provides a collaboration overlay on which the training audience can communicate by sketching tentative control measures and symbols (although not in great detail in the current MPS version). Audience members can view any overlay at will, but can modify only their own overlay and the collaboration overlay.

The functions described above are used by all exercise participants. Support personnel, however, have the additional capabilities of starting, pausing, and rewinding exercises, as well as manipulating the prepared tactical reports and displays contained in the MPS database files.

To present all these functions, the MPS requires a dual set of computer monitors at each station. One monitor presents a reports and messages interface, and the other presents a tactical displays and overlays interface. In addition, there are two versions of the MPS, one for the support personnel and one for the training audience. Figures 7 and 8 show the interfaces for the support personnel and training audience, respectively.

Personnel Support

Executing MEDALIST exercises requires the assistance of personnel who have the experience and expertise that are needed to provide instruction and evaluation on the topic being trained. It is highly recommended, however, that support personnel already be familiar with the training approach and specific exercise(s) to be conducted.

In all, the MEDALIST training approach requires the participation of three support personnel.³ These individuals fill the positions of O/C, assistant O/C, and system operator:

- The *O/C* is the primary trainer and should be the commander or grade command equivalent of the senior commander participating in the exercise. For example, in a brigade-battalion exercise, the O/C should be the division commander or assistant division commander, or the O/C equivalent.⁴
- The *assistant O/C* helps the O/C control the training by adjusting the tactical scenario according to tactical decisions made during the exercise and playing the roles of higher and subordinate units and "reach" intelligence sources. The assistant O/C needs the operations and intelligence experience at the echelons being trained. He should be the training unit or higher unit operations officer or executive officer, or the O/C equivalent.
- The *system operator* controls the MPS, the communication system built expressly for the MEDALIST training approach. The system operator should be familiar with Microsoft® Windows software, capable of operating the MPS, and prepared to train and assist other participants on the system.

³ As discussed later in this report, pilots of the MEDALIST prototype exercise indicate that it is possible to conduct MEDALIST training using only two support personnel. The two-person model would include an O/C who acts primarily as a performance coach and an exercise controller who performs the duties of the assistant O/C and system operator.

⁴ Army Field Manual 7.0 (DA, 2002b) states that commanders are to be the primary trainers of their units and actively engaged in all phases of training. Thus, the recommendation that a senior commander fill the O/C position is consistent with Army doctrine, though doing so represents one of the most time-consuming means of commander involvement. Because MEDALIST exercises are designed to be executed in a distance mode, O/Cs and assistant O/Cs could also be drawn from the pools of qualified personnel serving at the Army's War College and Combat Training Centers when unit commanders and staff officers are not available.

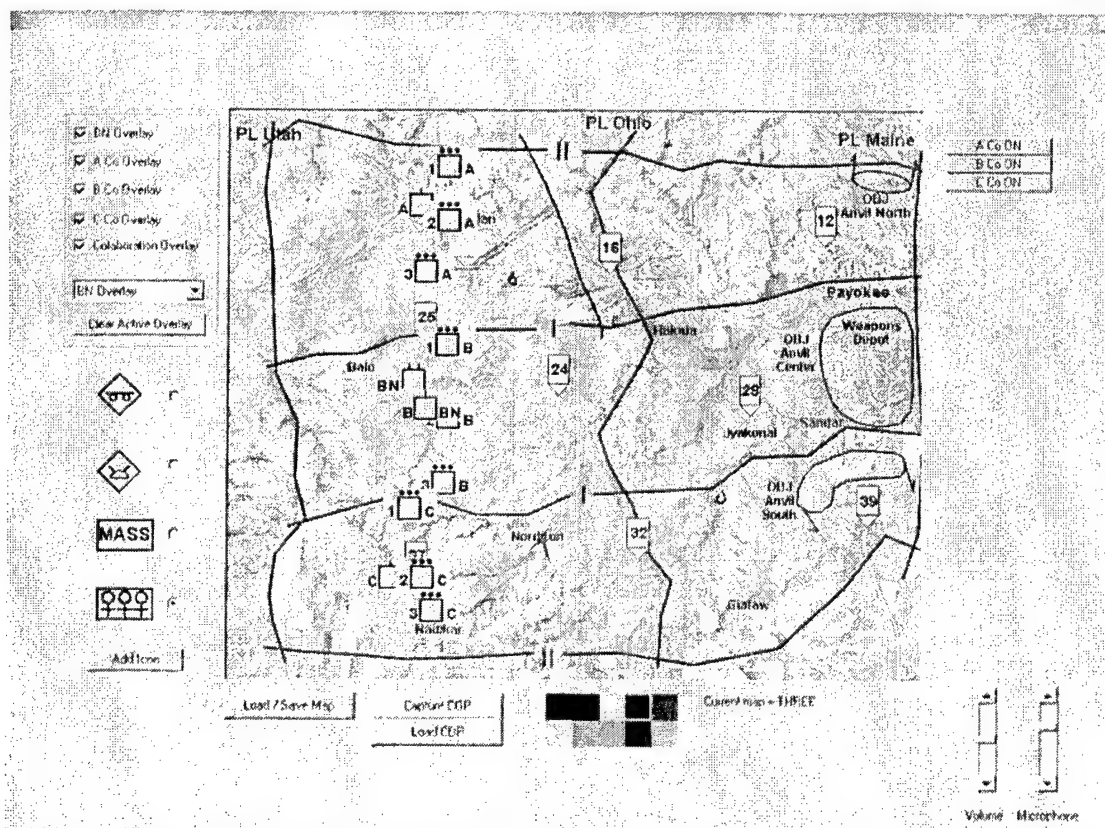
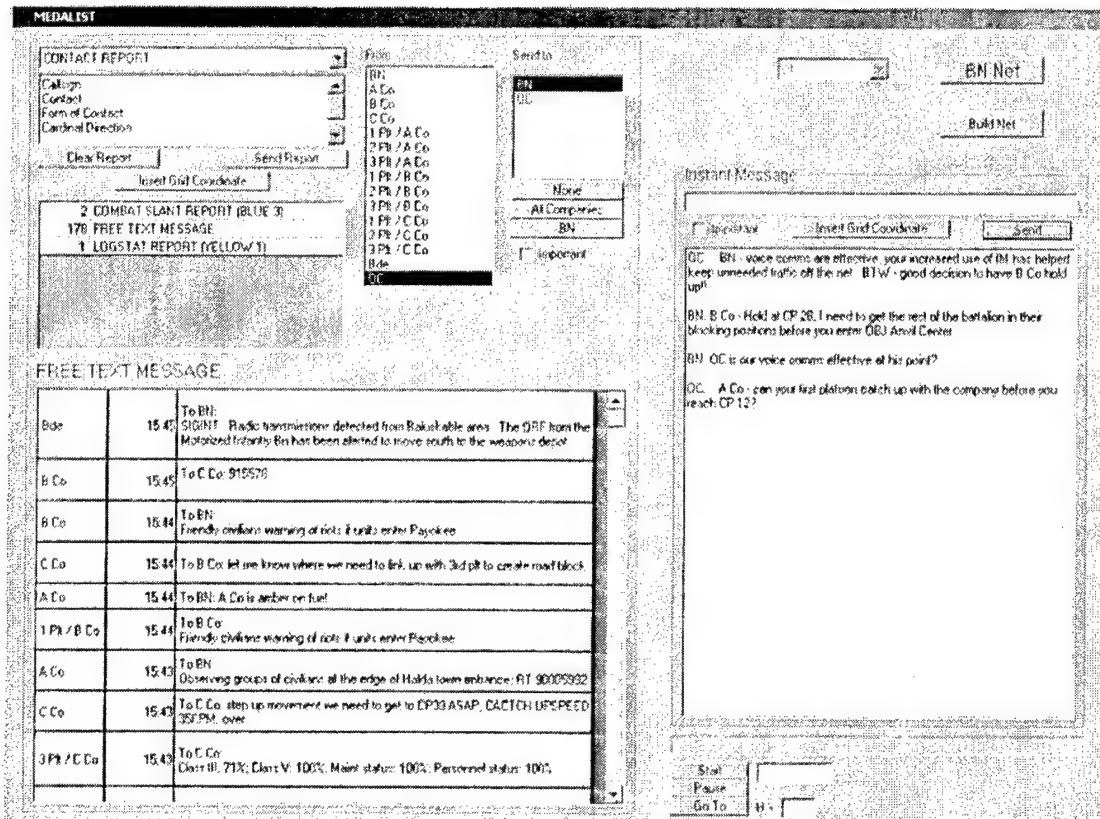


Figure 7. Prototype system interface for support personnel.

Implementation

To this point, the MEDALIST training approach has been described in terms of its audience, uses, exercises, and support requirements. This section describes how the exercises are implemented. The section begins with a discussion of the training objective and performance coaching models that enable users to take advantage of the structured, deliberate practice provided by the training. It then describes the planning, preparation, and execution activities required by MEDALIST exercises.

Training Objective

The focus of MEDALIST training exercises is provided in the form of training objectives. These training objectives are designed to support MEDALIST performance coaching (described later). The content of different training objectives varies based on the performance requirements addressed, but the format in which that content is presented should remain true to the model. The format, itself, is succinct and manageable, and reflects the organization of tasks contained in the Army's newly developed Mission Training Plans (MTPs; e.g., Army Training and Evaluation Plan [ARTEP]-71-3-MTP [DA, 2002a], ARTEP-17-97F-10-MTP [DA, 2003]). Each objective includes:

- an *objective statement* that identifies the overarching focus of the training,
- *tasks* that relate the focus to the different echelons being trained,
- *conditions* that provide the operational context for the training,
- *standards* that identify the key outcomes of effective task performance,
- *task steps* that indicate what actions are necessary to execute the tasks, and
- *coaching points* that identify how and how well those actions should be performed.

Two of these elements deserve special attention: coaching points and standards. Coaching points represent the primary focus of MEDALIST exercises and coaching. Standards are used to identify when coaching is required. The other components—the objective statement, conditions, tasks, and task steps—are developed and provided to set the context for performance feedback.

In developing a training objective, coaching points are identified for each task step by asking the following questions: What are the key and relevant (i.e., pertinent to the purpose of the training) elements of task step performance? What knowledge, skills, and abilities are critical to performing task steps? What are the indicators that the task step has been performed to standard and effectively? Answering these questions results in the identification of points that can help trainers assess whether the task steps are performed when appropriate and as appropriate, and whether performance meets the broader performance criteria specified in the training objective's standards. In sum, the coaching points make the focus of an exercise more explicit by directing attention to those aspects of performance that lie at the heart of the overarching training objective. The standards provide a mechanism for judging that performance. Figure 9 contains a sample training objective developed for the MEDALIST prototype exercise.

TRAINING OBJECTIVE	Commanders communicate to exert and facilitate decentralized battle command and control in a dispersed operating environment.
<p>TASK 1. The commander communicates to exert battle command and control.</p> <p>Conditions: The unit is operating in a dispersed and decentralized command environment. The command has established communications and digital connectivity, and reach sources are available to the commander. Intelligence summaries, the common operating picture, rules of engagement, and the scheme of maneuver have been provided. Tactical tasks have been assigned to subordinate commanders. The commander receives reports and tactical display updates from subordinate commanders and higher intelligence sources. These reports portray events that may adversely affect execution of the current scheme of maneuver within the commander's intent.</p> <p>Standards: The commander's communications enable him to exert battle command and control. The commander maintains an accurate situational understanding (SU). The commander ensures each subordinate commander understands his task and purpose within the unit's mission and scheme of maneuver, and his freedom and responsibilities in displaying initiative in the absence of further instructions. The commander controls the situation to ensure mission success.</p> <p>Task Steps and Coaching Points:</p> <p>Task Step A. The commander seeks information and assessments from subordinates and intelligence from higher (reach) sources.</p> <ul style="list-style-type: none"> • The commander requests all, but only the information needed to fill the gaps in his SU. • The commander monitors cross talk among his subordinates to fill the gaps in his SU. <p>Task Step B. The commander provides information and describes his SU, intent, and scheme of maneuver.</p> <ul style="list-style-type: none"> • The commander provides the information needed to meet his subordinates' information requirements. • The commander's descriptions of his SU allow the commander to confirm or clarify his SU. • The commander describes his SU, intent, and scheme of maneuver so that subordinates can describe them accurately and make decisions and take actions that demonstrate understanding. <p>Task Step C. The commander directs his subordinates.</p> <ul style="list-style-type: none"> • The commander's directives are issued so that subordinates can describe the directives accurately and make decisions and take actions that demonstrate an understanding of the directives. • The commander allows his subordinates to take initiative, demonstrating trust in those subordinates. <p>Task Step D. The commander communicates effectively.</p> <ul style="list-style-type: none"> • The commander uses the communication methods that are most effective for the content, situation, and other members of the command. • The commander's communications are clear, concise, and timely. • The commander requests information using direct or open-ended questions, as appropriate. • The commander requires the use of standing operating procedures. <p>Task Step E. The commander maintains open communication within the command.</p> <ul style="list-style-type: none"> • The commander establishes himself as an aid, not a threat, to his subordinates. • The commander monitors communications to identify and resolve conflicts. • The commander maintains contact with all subordinates to enhance situational awareness throughout the command. • The commander encourages his subordinates to request clarification of his SU, intent, scheme of maneuver, and directives. 	

Figure 9. Training objective from the prototype exercise.

TRAINING OBJECTIVE	Commanders communicate to exert and facilitate decentralized battle command and control in a dispersed operating environment.
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TASK 2. Subordinate commanders communicate to facilitate battle command and control.

Conditions: The unit is operating in a dispersed and decentralized command environment. The command has established communications and digital connectivity, and reach sources are available to the commander. Intelligence summaries, the common operating picture, rules of engagement, and the scheme of maneuver have been provided. Tactical tasks have been assigned to subordinate commanders. Subordinate commanders receive reports and tactical display updates from their notional subordinate units. These reports portray events that may adversely affect execution of the current scheme of maneuver within the commander's intent.

Standards: Subordinate commanders' communications facilitate battle command and control. Requests for information enhance the commander's SU and clarify the commander's intent and guidance. Reports and assessments enhance the SUs of the commander and other subordinate commanders and enable the commander to control the situation to ensure mission success.

Task Steps and Coaching Points:

Task Step A. Subordinate commanders request information and clarification of the commander's intent and guidance, as necessary.

- Commanders request all, but only the information needed, based on gaps in their SU.
- Commanders request clarification to ensure they understand the commander's intent and guidance.

Task Step B. Subordinate commanders assess subordinate unit messages and submit reports with assessments, if applicable, to their commander.

- Commanders provide information and assessments based on the common operating picture and their commander's intent.
- Commanders support their commander's development of an SU at every echelon.
- Commanders identify and provide all relevant information.
- Commanders emphasize key pieces of information.

Task Step C. Subordinate commanders cross talk to exchange information.

- Commanders cross talk to enhance their SUs.
- Commanders monitor cross talk to enhance their SUs.

Task Step D. Subordinate commanders communicate effectively.

- Commanders use the communication methods that are most effective for the content, situation, and other members of the command.
- The commanders' communications are clear, concise, and timely.
- The commanders request information using direct or open-ended questions, as appropriate.
- The commanders follow standing operating procedures.

Figure 9 (continued). Training objective from the prototype exercise.

Performance Coaching

The MEDALIST training approach hangs its hat on the incorporation of deliberate practice, where performance is repeated in a drill-like setting until improvement is achieved. Although practice alone can lead to improved performance, it does not guarantee it. Additionally, unguided practice does not control for the occurrence of negative training, where participants become efficient at performing tasks the wrong way. Deliberate practice, however, also relies on frequent and active coaching. Coaching increases the rate at which participants can

improve their performance, as well as the probability that they will learn to perform tasks correctly and by the most effective means.

Because the MEDALIST training approach incorporates the deliberate practice training method, which requires that tasks be performed repeatedly until mastered, active performance coaching is a key component of the approach. The purpose of MEDALIST coaching is to assist the training audience in bringing their performance to standard during the exercise, rather than simply identifying what the audience needs to improve during future training events.

To help achieve this purpose, the MEDALIST coaching model incorporates elements of an executive coaching model (The Executive Coaching Forum, 2001) that have been tailored to the Army training context. The tailored model facilitates an open flow of performance information among the O/C and training audience members and proceeds based upon a pre-training coaching agreement. It assumes the participation of an O/C with expertise in the content area(s) to be coached and a training audience that seeks to maximize the opportunity to receive expert coaching. The MEDALIST coaching process includes four key activities: (a) establishing a coaching agreement, (b) tracking performance, (c) coaching during the training, and (d) documenting a developmental action plan at the conclusion of the training.

The coaching agreement. In planning for MEDALIST training, the O/C and training audience establish a coaching agreement to ensure a collaborative coaching partnership. Making the agreement includes pre-training needs analysis and planning that determines (a) the audience's developmental goals, (b) the O/C's coaching goals, (c) expectations for how and who the O/C will coach and how the audience will respond to that coaching, and (d) provisions for pausing the exercise for coaching and repeating scenario events as required to achieve desired performance.

The training audience chooses their developmental goals by selecting the coaching points they want to emphasize during the training. The audience selects coaching points based on unit training assessments and recent training experiences. This allows the audience to identify the coaching points that will help them address their current training needs. In selecting coaching points, the training audience may wish to target one or more task steps (e.g., the commander directs subordinates). In this case, they would select most or all of the coaching points associated with the selected task step(s). Alternatively, they may choose to target coaching points across the range of task steps. The audience then provides the O/C with the list of developmental goals and any necessary background information regarding performance strengths and weaknesses in the areas to be trained.

The O/C's coaching goals represent the O/C's list or version of the audience's developmental goals (i.e., coaching points the audience wants to emphasize during the training). The O/C presents his coaching goals to the training audience prior to the training to ensure they reflect accurately the audience's developmental goals. The O/C uses the coaching goals during the training as a reminder of those aspects of performance on which he should focus his observation and coaching. As coaching goals are met, the O/C can check them off his list and focus more extensively on unmet goals.

Documenting expectations for how coaching will be conducted involves agreeing on the approach the O/C and audience will take to coaching. In MEDALIST exercises, coaching is intended to be conducted using an open approach, where the O/C coaches all members of the training audience directly. Although the O/C is to be the primary coach during the training, the senior commander and O/C should come to an agreement on the extent to which the senior commander will provide coaching—the senior commander may choose to be a more or less active coach. Coaching in MEDALIST training also requires participants to be professional, honest, open, trusting, motivated, strategic, discrete but direct whenever possible, and receptive to feedback. These characteristics are represented in a set of expectations, which are presented in Figure 10.

Expectations for the Observer/Controller (O/C)	Expectations for the Training Audience
<ul style="list-style-type: none"> • Maintains an objective and impartial perspective and the highest level of professionalism. • Invests himself in the success of the trainees' achievement of their development goals. • Acts in the best interests of the training audience. • Recognizes the limitations of his expertise and provides guidance only where qualified to do so. • Establishes a safe environment where the audience is comfortable discussing their performance. • Creates an environment that supports exploration and change. • Follows up on previously addressed topics. • Facilitates communication among members of the training audience. • Prevents misunderstandings by explaining input prior to delivery. • Hears all relevant perspectives and mediates conflict. • Delivers feedback in ways that encourage participants. • Listens to audience's perspectives with an open mind. • Provides honest and direct feedback. • Applies the discovery learning technique. 	<ul style="list-style-type: none"> • Fulfill their obligation to contribute to the coaching process. • Assume ownership of own learning. • Take responsibility for actions. • Be willing to discuss their performance. • Maintain an open mind and be willing to change it. • Try new approaches. • Accept credit and blame when appropriate. • Be honest and direct. • Respond to feedback in non-defensive ways. • Begin the coaching process with a willingness to learn. • Be willing to examine and possibly change aspects of the organization's operations. • Hold the O/C and subordinate commanders accountable to the agreed-upon goals. • Provide feedback on the performance of subordinate commanders. • Demonstrate trust in subordinate commanders. • Remove barriers to the agreed-upon coaching process. • View the O/C as a partner.

Figure 10. Expectations of coaching participants.

Because MEDALIST scenarios unfold rapidly, exercises should be put in pause mode for coaching that is expected to take more than a few seconds. After coaching, it may be of value to “rewind” the exercise, providing an opportunity for the training audience to achieve improved or correct performance before continuing the exercise. The O/C should rewind an exercise especially upon a trend of sub-par performance until that trend is reversed.

Tracking performance. Tracking performance on coaching points is critical to providing valuable coaching. Using a coaching guide, the O/C observes and records performance information related to the audience’s developmental goals.

A coaching guide, such as that shown in Figure 11, is provided for each exercise version. The coaching guides are organized by the key scenario events and present the standards to be achieved and the task steps and coaching points associated with those standards. They also provide space for recording observations. Prior to the exercise, the O/C should become very familiar with the training objective and coaching points; he should also mark or highlight, on the coaching guide, those coaching points that represent the training audience's developmental goals. During the exercise, the O/C should record his performance observations that relate to the highlighted coaching points. The O/C can place various marks in the boxes that precede coaching points to indicate points to address or points that were performed effectively.

Coaching. During an exercise, participants conduct and participate in coaching according to the coaching agreement established prior to the training. All coaching is designed to lead the audience to achieve its developmental goals. The O/C attends to his coaching guide, and the training audience participates actively and positively in the coaching. Scheduled coaching opportunities are built into MEDALIST exercises, but coaching may be conducted at any time to help the audience achieve their developmental goals. An O/C should coach whenever performance does not meet the specifications represented in coaching points and standards, but especially upon trends of sub-par performance or when sub-par performance threatens the intended course of the exercise.

An O/C can use two general coaching approaches in the training. Both approaches lead ultimately to a focus on specific coaching points. The first approach is a direct approach. It is used when an O/C observes that the execution of a task step has not been performed according to one or more of the specifications identified in the coaching points. Further, it is normally brief, driving directly at the performance observed. This type of coaching can be conducted immediately and directly to the individual.

The second approach is an indirect, exploratory approach. It involves questioning training audience members on broader performance outcomes or standards (e.g., the battalion commander maintains an accurate situational understanding, company commanders enhance their commander's situational understanding and enable him to control the situation) to get at issues more directly related to task step performance and whether that performance falls in line with coaching point specifications. The second approach requires pausing the exercise, usually at the conclusion of an exercise event and especially after exercise events in which an O/C perceives that standards are not met, but the cause has not been observed. It may employ questioning that starts at the group performance level, but it always leads to discussion on individual or team performance, as reflected in the coaching points. As an example, an O/C may ask a commander to describe his situational understanding and, then, direct the discussion to discover why that understanding does not accurately reflect ground truth. The reason may be related to task step and coaching point performance. Figure 12 contains detailed examples of direct and indirect coaching. Note that direct coaching events reference coaching points and that indirect coaching events reference performance standards and coaching points.

Coaching Guide, Compliance Inspection—Bn-Co, Version A			Page 1
Event 1 – Unit encounters organized resistance At H+14, the civilian population patterns of behavior are not normal. The civilians are aware that threat forces are planning to confront U.S. forces.		Standards Battalion commander maintains an accurate situational understanding (SU). Company commanders enhance the battalion commander's SU and enable the battalion commander to control the situation.	
Message Text	Company Commander Task Steps and Coaching Points	Notes	Battalion Commander Task Steps and Coaching Points
-H+0 Crossing line of departure, no contact -H+ 1 Cell phone activity in the area of operations has increased significantly -H+2 Little farm activity noted in area -H+3 Moving Target Indicator (MTIs) show heavy commercial bus activity to the east -H+5 Civilian population is hostile/sullen: no military age males present -H+7 Stores closed in Balokia -H+11 Polish Hussars report M1-24 observing your flank -H+14 Civilians not friendly as usual	Task Step A. Commanders request information and clarification of the commander's intent and guidance, as necessary. <input type="checkbox"/> Request all, but only required information. <input type="checkbox"/> Request clarification of Cdr's intent and guidance. Task Step B. Commanders assess subordinate messages and submit reports with assessments, if applicable, to their commander. <input type="checkbox"/> Provide information and assessments based on the common operating picture and their commander's intent. <input type="checkbox"/> Support their commander's development of an SU at every echelon. <input type="checkbox"/> Identify and provide all relevant information. <input type="checkbox"/> Emphasize key pieces of information. Task Step C. Commanders cross talk to exchange information. <input type="checkbox"/> Cross talk to enhance their SUs. <input type="checkbox"/> Monitor cross talk to enhance their SUs. Task Step D. Commanders communicate effectively. <input type="checkbox"/> Methods fit the content, situation, and recipients. <input type="checkbox"/> Clearly, concisely, and timely. <input type="checkbox"/> Use direct and open-ended questions appropriately. <input type="checkbox"/> Follow standing operating procedures (SOP).		Task Step A. Commander seeks information and assessments from subordinates and intelligence from higher (reach) sources. <input type="checkbox"/> Requests all, but only required information. <input type="checkbox"/> Monitors cross talk. Task Step B. Commander provides information and describes his SU, intent, and scheme of maneuver. <input type="checkbox"/> Meets subordinates' information requirements. <input type="checkbox"/> Confirms or clarifies SU. <input type="checkbox"/> Subordinates understand SU, intent, and scheme of maneuver. Task Step D. Commander communicates effectively. <input type="checkbox"/> Methods fit the content, situation, and recipients. <input type="checkbox"/> Clearly, concisely, and timely. <input type="checkbox"/> Uses direct and open-ended questions appropriately. <input type="checkbox"/> Requires use of SOP. Task Step E. Commander maintains open communication within the command. <input type="checkbox"/> Acts as an aid, not a threat, to subordinates. <input type="checkbox"/> Monitors communications to resolve conflicts. <input type="checkbox"/> Maintains contact with all subordinates to enhance situational awareness. <input type="checkbox"/> Encourages subordinates to request clarification of his SU, intent, scheme of maneuver, and directives.

Figure 11. Coaching guide from the prototype exercise.

- Monitor the effectiveness of coaching discussions and establish group norms that reward instead of punish team member contributions (Bing & Laroche, 2002; Bailey & Luetkehans, 1998).
- Eliminate communication apprehension and avoidance that may surface due to evaluation apprehension or negative perceptions of communication competence (Marshall, 2001).
- Understand the strengths and weaknesses of the communication technologies supporting the discussion, using voice, text, and visual methods as appropriate to communicate ideas effectively and maintain effective discussion (Dilworth, 1999; Willis, 1992).
- Use the available communication technologies, but humanize the coaching by focusing on the participants and not the technologies (Willis, 1992).
- Prepare the training audience to deal with technical complications (Willis, 1992).

Developmental action plan. After an exercise, the training audience is responsible for formulating a developmental action plan. The O/C assists by identifying the goals that have and have not been met. Following the last coaching opportunity, the O/C walks through the audience's progress on each of the developmental goals and provides time for the training audience to develop a plan for achieving those goals in future training.

Planning, Preparation, and Execution

The implementation of MEDALIST exercises encompasses the traditional steps of planning, preparing for, and executing an exercise. Planning and preparation activities should be conducted in a way that ensures the desired focus will be achieved during execution. The main requirements to be met in planning and preparation are to (a) make sure all participants are familiar with the training objective and coaching model, (b) identify the audience's developmental goals, and (c) develop a familiarity with how to use the MPS.

The execution of each MEDALIST exercise lasts approximately 2 hours. This allows for an approximately even mix of scenario run-time and coaching. An exercise begins with the senior commander briefing his intent and scheme of maneuver as he conducts troop-leading procedures. As the exercise proceeds, written tactical reports and tactical displays are sent to the training audience portraying scenario events. Tactical reports are sent by notional subordinate and higher units. For example, in a battalion-company exercise, reports from notional platoons are sent to the company commanders and reports from notional brigade sources are sent to the battalion commander. Tactical displays are used to emulate the Army's operational digital display technology that provides the COP. All tactical reports and displays are delivered at predetermined times throughout an exercise using digital communication functions supported by the MPS. Because the exercises focus on improving task performance rather than on mission outcome, the tactical scenarios need not continue until the mission has been completed.

During an exercise, scripted events cause the commander to (a) interact with his subordinates and reach intelligence sources, (b) revise his situational understanding, and (c) consider revising his intent and/or scheme of maneuver. The routine of presenting events to

prompt changes in schemes of maneuver is repeated several times during an exercise to prompt repeated performance of the training objective.

Scenarios, though scripted, also incorporate limited flexibility through the use of scenario branches. Branches occur at key decision points at which the training audience must choose whether to change their scheme of maneuver. For each branch, TSPs provide two or more sets of reports and displays that can be selected and used by training support personnel based on the commander's tactical decisions. For example, a scenario may present events that are intended to cause the commander to consider changing one of his subordinate units' avenues of approach. The scenario materials, which anticipate the two avenues of approach that are likely to be used, include two sets of reports and displays. One set presents continuing scenario events and is used if no change is made. The other presents events that would occur if the anticipated change were made.

To review, the MEDALIST training approach provides a multi-echelon, distributed method of training that supports the requirements of current as well as future forces. Its key features include its applicability to multiple audiences, provision of a tailored simulation and communications system (i.e., the MPS), and utilization of repeated practice and active performance coaching. During the project, the approach was demonstrated, evaluated, and refined through the development and implementation of a prototype exercise.

The Prototype Exercise

The MEDALIST prototype exercise was developed to demonstrate the project's training requirements and approach. The exercise represents only one version of one exercise, but it is documented in a TSP design that supports related, though notional, exercises that were not developed during the current project. The exercise demonstrates all the characteristics of the training approach, with the exception of scalability. The TSP for the exercise is provided on CD along with a copy of the MPS (Graves et al., in preparation). This section provides only an overview of the exercise, covering its audience, mission, and training objective.

The exercise was developed at the battalion-company level and its audience includes a battalion commander and three company commanders. The exercise is set in a brigade-level scenario in which the brigade is conducting Security Operations. The battalion, representing the brigade's main effort, is conducting a Compliance Inspection. The training objective for the exercise was developed from the project's examination of effective communication in decentralized battle command in dispersed operations. The entire objective, to include tasks, conditions, standards, task steps, and coaching points, is shown in Figure 9, but the objective and task statements are as follows:

- *Training Objective.* Commanders communicate to exert and facilitate decentralized battle command and control in a dispersed operating environment.
- *Task 1.* The commander communicates to exert battle command and control.
- *Task 2.* Subordinate commanders communicate to facilitate battle command and control.

During the project, the exercise was implemented six times in pilots. The pilots provided feedback on the training requirements, approach, and exercise. Appropriate elements of that feedback were incorporated into the final product designs.

Formative Evaluation

The intent of the MEDALIST project was to generate and evaluate training requirements and methods in order to provide recommendations for the development of future Army training. This was accomplished through the design, development, and evaluation of prototype products, including a prototype training exercise. The project's evaluation component focused on obtaining judgments of the potential effectiveness, value, and acceptability of those products.

Method

The method of evaluation selected for the MEDALIST project was formative evaluation. In formative evaluation, products undergo iterative review and testing during their design and development phases. This allows developers to identify and incorporate needed refinements and improvements until the products are ready for use. The formative evaluation conducted during the MEDALIST project reflected those evaluations conducted in previous ARI training R&D (e.g., Graves & Myers, 1997). It was based on the method of evaluation described in Kirkpatrick (1994) and focused almost exclusively on the first, or "reaction," level of evaluation. The reaction level addresses the extent to which a program is accepted and valued by its potential users, and includes estimates of effectiveness. It is based on the perceptions of users who have reviewed or piloted the program and not often on objective data.

Early in the project, iterative reviews of training concepts and products were conducted by project staff and the ARI project contracting officer's representative. All aspects of the products were reviewed, including the focus of the training requirements, the characteristics and design of the training approach, and the tactical scenario and TSP components supporting the prototype exercise. Reviews resulted in mid-course revisions of these products that enabled more extensive testing later in the project through product implementations, or pilots, of the prototype exercise. The prototype exercise was developed to incorporate the training requirements and demonstrate the approach; it, thus, enabled an evaluation of all project outcomes.

Two types of pilots were conducted during the MEDALIST project: internal and external. Project staff conducted one internal pilot. In this pilot, project staff filled all participant positions, including support and training audience. Five external pilots followed. In these pilots, Army personnel filled the training audience positions, and project staff again filled the training support roles. This allowed for the continued refinement of the coaching approach through repeated practice and testing.

During the pilots, project staff collected feedback from participants through direct observation, informal discussions, and post-exercise structured interviews. Evaluation guides were given to all project personnel, including those observing and those participating in the pilots. The guides contained questions to answer during and after the pilots. The guides also

contained structured interview questions directed primarily at the training audience. Project staff began structured interviews by stating that the purpose of the pilots, in addition to providing a valuable training experience, was to gather constructive criticism that would lead to improvements in the program. Project staff encouraged interview participants to point out aspects of the training that were not effective. Evaluation guides were updated for each pilot. Updates were made to enable the evaluation of the most recent TSP revisions and the further investigation of feedback gathered during the previous pilot(s). Appendix B provides a sample evaluation guide.

The remainder of this section focuses on the pilot implementations. It provides the key feedback from those pilots, most of which related to TSP design, the deliberate practice component, the coaching approach, and the MPS. A majority of the feedback was incorporated into the final products. It was decided that some, however, should be incorporated in future development, to include the MEDALIST follow-on project that began three months prior to the conclusion of the MEDALIST project. That feedback is discussed in more detail in the Recommendations for Future Research section of this document.

The Internal Pilot

The project's internal pilot evaluated the initial version of the prototype exercise and TSP. The pilot focused primarily on the training approach, MPS, and TSP. It did not address the training requirements in any detail.

The training approach, including its reliance on the MPS, was evaluated in a very general sense for its capability to immerse the training audience into the training experience. That is, there was some concern that the artificial environment created solely by scripted reports and displays would cause the training audience to lose interest in the training. This was not confirmed; instead, participants indicated that the experience held their interest and represented a valuable method of training.

Recommendations did surface, however, regarding the design and functionality of the MPS. Those that were incorporated after the pilot included the addition of:

- the collaboration overlay,
- the ability for the O/C to send messages as if he were any participant,
- a time stamp on instant messages, and
- distribution lists that allow reports to be sent to the entire audience (e.g., battalion and company commanders) and the group of subordinate commanders (e.g., all three company commanders).

The initial version of the TSP was written to provide comprehensive guidance on how the training should be conducted. This was necessary to ensure a complete implementation and evaluation of the concepts relating to repeated, deliberate practice; frequent, active performance coaching; and a scenario driven by highly scripted reports and displays. In order to be tested,

these concepts had to be implemented as envisioned by developers, and this required providing training participants with an abundance of guidance.

To evaluate the TSP, all pilot participants read their materials the week before the pilot to ensure everyone understood his or her roles and responsibilities. After receiving comments, project staff revised the guides and the updated guides were used during the pilot. One comment made by almost all the participants indicated that the guides contained too much information. Because the training approach and exercise had not yet been executed fully, project staff decided not to reduce the information in the TSP. In fact, they held this position through the remainder of pilots, and the final TSP contains comprehensive guidance on how to conduct the training. As explained later, the MEDALIST follow-on project will address this issue as it develops a more mature, user-friendly TSP model.

Other comments on the TSP suggested that several specific changes be made. First, the instructions for making the coaching agreement were neither clear nor sufficiently detailed and needed further refinement. During the course of the external pilots, project staff evaluated the coaching agreement and refined the guidance provided in the TSP. Second, training support personnel found it difficult to keep track of events and decision points in the scenario. Project staff developed a scenario storyboard that indicates when decision points occur in relation to specific reports and displays and provides guidance on which reports and displays to send depending on the scenario branch selected. Third, the system operator indicated the need for a printout of the entire list of tactical reports. This, too, was added to the TSP and a revised package was prepared for use during the external pilots.

The External Pilots

Project staff conducted a total of five external pilots. The first was originally intended to be the only external pilot conducted during the project. The initiation of the follow-on project, however, allowed the conduct of four additional pilots. These proved valuable, especially to the refinement of the coaching model.

The Initial External Pilot

The first external pilot occurred approximately three weeks after the internal pilot and used a slightly revised version of the TSP and MPS. Four captains from the Armor Captain's Career Course at Fort Knox, KY, participated as the training audience, one as the battalion commander and three as company commanders. Audience positions were assigned by the school troop commander based on seniority and experience.

The captains were informed of their requirement to participate in the pilot only a day before the exercise and were unable to read their training materials or prepare prior to their arrival. This hurt the evaluation because the MEDALIST approach assumes adequate time for planning and preparation, especially in respect to becoming familiar with the training objectives and coaching model. Project staff improvised by briefing the captains before the exercise began and then providing an hour to review the tactical materials and conduct troop-leading procedures.

The O/C, a part-time project staff member and former Army officer, supervised the tactical preparation.

Cutting planning and preparation short restricted the planned evaluation of the training materials, but the pilot generally provided another good test of the training approach and exercise. The most valuable aspect of the pilot was the opportunity to observe the implementation of the coaching approach.

Once started, the exercise ran smoothly with only a few technical problems, and participants reported that they liked the program. Specific comments of this nature indicated that the participants, as company commanders, would like to take the program to their units to use with their new lieutenants. They also stated that the program provided a good way to train communication. Other specific feedback and observations indicated the following:

- The description of coaching in the O/C's training guide required additional explanation in order to enable the O/C to address the communicative aspects of battle command. After the pilot, guidance was added to clarify the difference between safe and target topics and to describe two specific methods of coaching: direct and indirect.
- Again, too much information was provided in the TSP. This kept the participants from reading the materials carefully. In response, it was suggested that the approach be renamed to depict more accurately the focus of the training, so that the focus would not require so much explanation in the TSP itself. One suggestion was to use a model in which the base MEDALIST title would be accompanied by a term such as, "communication drill." This would apply to all MEDALIST exercises in which communication is the primary focus. Depending on the focus, other titles, such as "decision-making drill," could be used. Project staff recommended that this naming convention be incorporated during the follow-on project.
- During the pilot, the O/C conducted all coaching through the senior commander participating in the exercise. This approach can work, but coaching all participants directly was still viewed by project staff as being more effective for the MEDALIST training approach. Project staff added guidance to the TSP recommending that the O/C coach all participants directly, but in coordination with the senior commander.
- The number of support personnel should be reduced from three to two. The O/C position should be kept, and the assistant O/C and system operator positions should be combined into an exercise controller position. Further, the O/C should be called a "coach" to eliminate the effects of the traditional nuances associated with the use of the title, "O/C." Project staff expected this to enable coaching that would be more consistent with the MEDALIST model. These changes were designated for implementation in the follow-on project.
- The training audience must understand and take ownership of the focus of the training prior to an exercise. The TSP already contained guidance to this effect (as part of the coaching agreement) and so no changes were made in that respect. However, project staff tried to ensure that the audiences of all remaining pilots had ample time to review their training materials and discuss the focus of the training with the O/C prior to execution.

- The audience must establish standing operating procedures for using the various modes of communication supported by the MPS, especially the instant messaging and collaboration overlay functions. Guidance was added to the TSP to this effect.
- More frequently updated tactical displays would increase realism. In the prototype exercise, displays are updated approximately every five minutes. Occasionally, reports of battlefield events would arrive slightly before the COP was updated, and this caused minor confusion for one of the participants. It was decided that the prototype exercise would not be modified to include more tactical displays, rather that the timing of displays would be checked and adjusted to synchronize better the presentation of reports and displays. Future exercises may use a larger number of displays.
- As the exercise progressed, the MPS began to run more slowly, delaying the arrival of displays, reports, and messages. This required that the design of the MPS, in terms of how it stores data, be refined to allow information to be processed more rapidly. This was accomplished during the project, not eliminating the problem, but reducing the effect. Future versions of the system should remedy the problem.
- Finally, numerous refinements to the tactical materials were suggested. These, as appropriate, were incorporated into the TSP versions used during the follow-on pilots.

Follow-on Pilots

The second set of pilots occurred in the twelfth month of the project, just prior to its conclusion. The training audiences for these pilots were lieutenants who had just completed the Armor Officer's Basic Course (AOBC), again at Fort Knox, KY. In each pilot, one lieutenant was selected to be the battalion commander, and three other lieutenants filled the company commander positions. The battalion commanders were chosen based on seniority and experience. This audience of lieutenants, although not at all representative of the senior officers for whom the battalion-company exercise was written, provided a good measure of the extent to which the general training approach could be applied in a TRADOC setting. The pilots used two O/Cs and both participated in two of the pilots. Using two O/Cs allowed for a more representative evaluation of the coaching model.

In the follow-on pilots, the training audiences had varying amounts of time to review their materials prior to the training. Additionally, the coaching agreements were made prior to the exercises. Finally, the O/C's were able to use the new coaching methods—direct and indirect—during the pilots. As the O/Cs worked through the model, their coaching became increasingly effective at addressing the intended focus of the training.

Follow-on pilot 1. In the first follow-on pilot, the individual playing the senior commander executed the coaching agreement with the O/C several days prior to the training. On the day of the pilot, the senior commander and O/C reviewed the agreement that was made, to include the coaching points that would be addressed in the training. Training audience feedback gathered during and after the pilot indicated the following:

- The training guide for the training audience should include only an explanation of the MPS and a brief overview of the coaching and execution models. In response, project

staff developed a short version of the guide, and the shortened guide was used in the third and fourth follow-on pilots.

- The training audience viewed the training as being restrictive in the sense that it did not allow much freedom for tactical decision-making. Given its focus on communication, project staff estimated that this was not a problem for the prototype exercise. However, future exercises with expanded focuses may need to provide a greater number of scenario branches.
- The MPS should include a capability to click on icons in the tactical displays to get status information. In addition, users should be able to zoom in on the map and obtain grid coordinates by clicking on the map. The MPS was subsequently modified to provide a capability for obtaining grid coordinates. Other changes may be possible in future versions of the MPS.
- Frequent coaching served to improve the training experience and was not disruptive.
- The training should be used prior to unit-level training in simulators (e.g., the Close Combat Tactical Trainer). This would allow participants to refine their communication and battle command skills before executing training that involves other tasks.
- The approach would be a good tool for commanders who need to train with new subordinate commanders.

Follow-on pilot 2. The participants and planning and preparation activities of the second follow-on pilot mirrored those of the first. Key training audience feedback from this pilot included the following:

- The coaching agreement represented a “value-point,” but it may be worth making the agreement with the entire training audience present, especially when the training is used in a TRADOC setting.
- Pausing the exercise for coaching provided breaks in the action, allowing time for the training audience to think about their performance. The audience indicated that “coaching” is a perfect word for the feedback that was provided during the training.
- The MPS was easy to use. However, the report formats provided by the MPS reporting function should only include report and field titles and users should be able to type over the titles.
- The AOBC does not currently focus on reporting, although good reporting is required in the execution of other course activities. Thus, the program should be integrated into the AOBC.

Follow-on pilot 3. In the third follow-on pilot, four second lieutenants, all with prior service, came directly from an AOBC field training exercise. The group had limited time to review the materials before arriving. The O/C gave them 30 minutes to review the operations order and then conducted a joint session to develop the coaching agreement. Audience feedback indicated the following:

- Again, the audience liked how the coaching created situations where they had to think about what they were doing, and the coaching helped them improve their performance. The audience actually would have preferred more coaching. Specifically, they recommended that the coach provide more "hints" (i.e., guidance) and informal or quick coaching instead of pausing the exercise for extended coaching.
- The audience reported that the MPS represents a good tool for training and that it is user-friendly due to its MicroSoft® Windows interface.
- This audience believed that the training, due to its capability to be executed in a distributed mode, would be good for U.S. Army National Guard units. They did not believe, however, that it should be incorporated into the AOBC, as it would take too much time away from field training.

Follow-on pilot 4. The participants and planning and preparation activities of the fourth follow-on pilot reflected those of the third. Key observations and feedback from this pilot included the following:

- The audience viewed the coaching as valuable and suggested that using the instant messaging function was the best way to conduct coaching. They did not believe that pausing the exercise for coaching was valuable.
- The audience believed the MPS was useful as a training tool, but recommended several changes. They recommended including (a) a greater number of voice nets, (b) a sound effect to indicate the arrival of reports, (c) an indicator of which reports are new, and (d) a capability to erase marks made on overlays. Project staff will consider incorporating these functions into future versions of the MPS.
- Finally, the audience stated that the training approach was effective in isolating the tasks being trained and generating performance improvement.

Evaluation Summary

The evaluation of the training requirements and approach included numerous implementations of the prototype exercise. Together, feedback resulted in several key and many minor modifications that served to improve the program. Most importantly, however, both the concepts and the design employed by the program were shown to have significant potential for future integration into TRADOC and FORSCOM settings. The most notable finding in this area was that pilot participants representative of the approach's intended audience viewed the program as an effective, efficient, and promising method of training. This was especially true among younger audiences, where several lieutenants reported that they were extremely familiar and comfortable with web-based communication, such as that supported by the instant messaging feature of the MPS.

Recommendations for Future Research

The project concluded by generating a set of recommendations related to the continued development of the MEDALIST training approach and future forces training in general. Many

of the recommendations represent ideas that can be incorporated or explored in the MEDALIST follow-on project. The areas in which recommendations are provided include the following:

- Expanding the focus and application of the training approach.
- Refining the material support model.
- Refining the performance measurement component.
- Evaluating the coaching model.
- Identifying simulation requirements for future forces training.
- Integrating the MEDALIST approach into Army training.
- Designing training for future forces.

An Expanded Focus and Application

The MEDALIST project's main effort involved the design of a multi-echelon, distributed training approach and prototype exercise. The approach is capable of providing training on the range of battle command information support (i.e., communication) tasks, which are fast becoming performance requirements in the Army's emerging operational environment. The exercise, developed as an instantiation of the approach has a narrower focus: The objective of the exercise is to train small teams of commanders and leaders on the basic communication tasks and skills that support decentralized battle command in dispersed operations. Exercise tasks cover the base communication requirements of battle command, including (a) attaining information from subordinate and higher sources, (b) providing information to and directing subordinates, (c) requesting information and clarification, (d) submitting reports and assessments, and (e) conducting cross talk to support the exchange of information. Communication skills are addressed by a set of general guidelines for effective distributed communication and fall under headings that include (a) providing key and relevant information, (b) maintaining open communication within the command, (c) maintaining the involvement of all participants, and (d) communicating effectively (e.g., clearly, timely, in accordance with SOP). In itself, the prototype exercise represents adequately how the larger training approach should be implemented. Its focus, however, covers only a portion of the total number of topics that can be addressed by the approach.

Given the overall positive reception of the MEDALIST training approach during project pilots, it is appropriate that developers give more thought to how the overall approach could be used to address a wider variety of performance requirements. *Recommendation 1: Future research should develop and evaluate a framework by which the MEDALIST approach can be implemented in order to train a broader array of objectives.* At this point in the approach's development, it is possible to outline a tentative framework that can be used to support that research. The framework suggested in this report consists of three levels of training: advanced, intermediate, and basic. Together, the three levels represent a staged approach to training the communication (i.e., information support) tasks involved in battle command. Figure 13 depicts the three levels of training by presenting sample TSP titles at the advanced and intermediate levels, and sample exercise (i.e., drill) titles at the basic level.

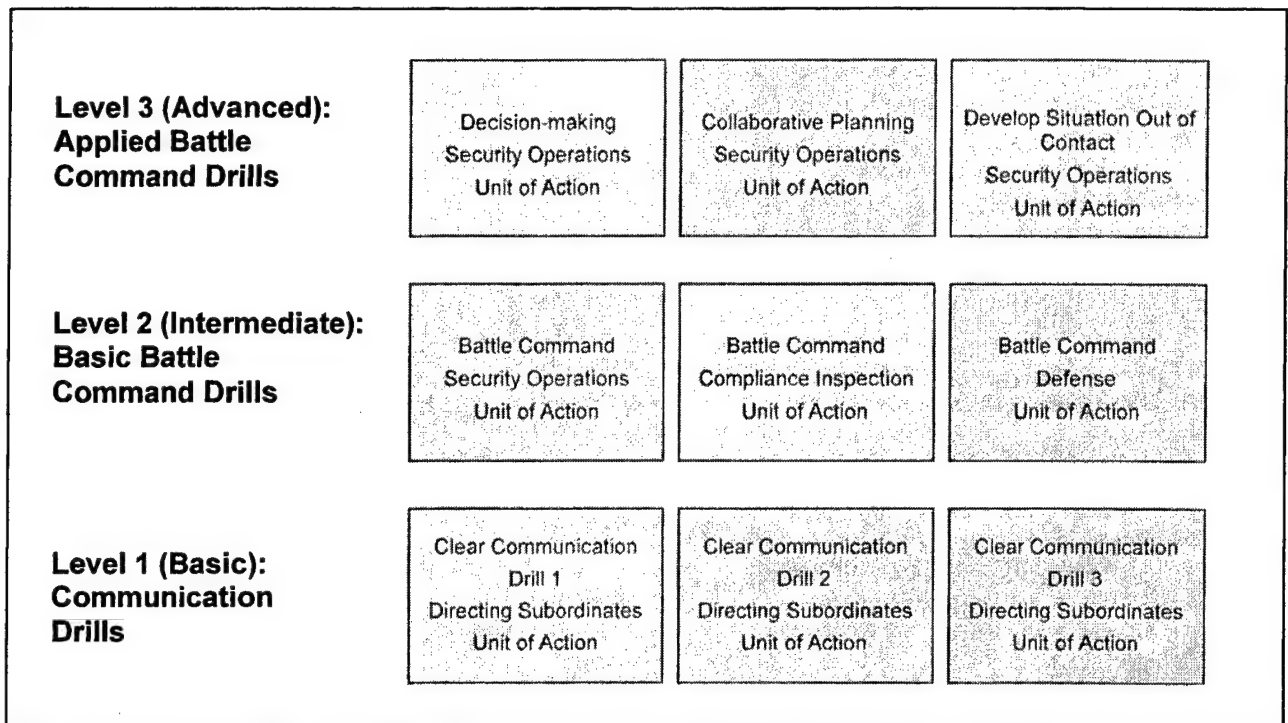


Figure 13. Sample framework for future training.

According to the framework, Level 1 training, called *MEDALIST Communication Drills*, would represent “crawl-level” training on information support. This training would provide process-oriented training on basic distributed communication skills. Skills trained would include, as a minimum, those skills incorporated into the focus of the existing prototype exercise. The training itself would be implemented as a series, or set, of short (e.g., 10 minute) drills, and the drills contained in a set would be executed consecutively and as a single training event. Each set of drills would be framed in the context of a single mission segment, but each drill in a set would present different battlefield conditions (e.g., threats). Sets of drills would be designed as “part task trainers,” with each set cueing a limited number of communication skills and all drills in a set cueing the same skills. This would help drive the focus of the training down to the MEDALIST coaching point level. Limiting the number of tasks trained in order to maintain focus has been employed effectively in the lower-echelon training exercises of the Army’s Virtual Training Program at Fort Knox, KY (Hoffman et al., 1995).

In Level 1 training, different sets of drills would be developed for different mission segments, in as far as the different segments would cue the performance of different communication skills. The same mission and intelligence would be used for all the drills in a set, keeping development and preparation time to a minimum. Drills within a set would be conducted by an audience until proficiency on those skills addressed is attained. This would provide a unique opportunity for an audience to approach automaticity, approximating “over-learning,” on skills that ought to be executed as a matter of course.

Level 1 drills would offer the distinct advantage of enabling audiences to understand that mission outcome is not, by itself, pertinent to the training. This would reduce the tendency for an audience’s focus to drift towards completing the mission and increase the likelihood that

attention would remain directed toward the specific skills trained. If used as intended, Level 1 training would prepare an audience for training with an expanded focus.

The existing MEDALIST prototype exercise is an example of the framework's Level 2 training, called *Basic Battle Command Drills*. This level of training would also be process-oriented, training basic communication skills. It would do so, however, within the context of an entire mission, where a broad range of communication skills would be trained. Thus, it would be more akin, than the Level 1 drills, to "whole-task training." To support different audiences and mission training requirements, developers would develop different drills for different unit types and missions.

Level 2 training would have two uses. First, an audience could use the drills to train the range of basic communication skills required in the execution of battle command. Second, an audience could use the drills as diagnostic tools, allowing unit commanders to determine where their weaknesses lie. For instance, after implementing a Level 2 drill, a commander may decide that his unit should conduct certain Level 1 drills that focus on selected basic communication skills. Alternatively, he may determine that his unit is ready to take the next step and conduct training that enables it to apply the basic communication skills in specific task settings.

Whereas the first two levels of training would have a process-oriented focus on basic communication skills, Level 3 training—*Applied Battle Command Drills*—would target the application and transference of those skills. That is, Level 3 training would focus on the design, content, and delivery of communications as they occur in specific battle command task settings. Task settings could include decision making, collaborative planning, and developing the situation out of direct contact⁵, among others. In Level 3 training, the more basic communication skills would represent a secondary focus to be addressed only if necessary.

Material Support

The material support, or TSP model, developed during the MEDALIST project is designed to support those characteristics of the MEDALIST training approach that enable scalable and adaptable training. The model stipulates the development of individual TSPs for different training objectives—one package per objective. Further, each TSP contains a single set of training guides and various sets of exercise attachments, one set of attachments for each exercise version supported by the package.

Based on the implementations of the MEDALIST prototype exercise, as well as on the conclusions of previous structured training R&D (Hoffman et al., 1995; Graves et al., 1997; Gossman et al., 1999), it is clear that at least one key revision should be made to the existing TSP model before it can be used in a wider context. *Recommendation 2: Information within the TSP should be redistributed, freeing users who are familiar with the approach from having to handle information that they do not need.* This would require the development of a single MEDALIST Training Manual that would provide comprehensive guidance on the training approach. The manual would be designed for users who have not previously executed MEDALIST training. In addition, the development of a training manual would allow the training guides and exercise

⁵ This task is described in Gossman, Burnside, Flynn, Dannemiller, and Mauzy (2002).

attachments to be collapsed into single, exercise version-specific guides that would consist entirely of participant tasks, tactical materials, execution materials, training objectives, and guidance on operating the MPS. Multiple exercise guides, one for each type of participant, would still be required for each exercise version.

Implementing this approach would have two main benefits. First, participants would receive only as much information as they need to conduct the training. Second, and no less important, a single TSP could be used to support all or large sets of MEDALIST exercises.

Performance Measurement

The MEDALIST training approach currently supports the subjective, but not objective, measurement of performance. Future research could explore the integration of objective measurement, but the eventual success of the approach depends not so much on its use of objective measurement, as it does on the *effective application* of performance measurement in feedback situations. Effective application of performance measurement demands measurements that are not so much justified by their accuracy, but that are helpful in generating performance discussion and improvement.

The MEDALIST training objective model uses coaching points to help both the O/C and training audience generate helpful feedback. The coaching points identify how tasks and task steps should be performed and include some general performance criteria. More detailed criteria, however, could be developed to encourage the use of coaching points that involve highly subjective judgments on the effectiveness of performance. This is true especially in areas such as communication style and technique, where participants will likely be particularly sensitive to criticism in any form, be it constructive or not. For instance, one of coaching points indicates that communications should be concise and direct. Yet, there is no existing standard or measure provided to indicate the meaning of these concepts. It is left to the O/C and training audience to determine what is, in the best case, effective, and in a less desirable case, acceptable.

During project pilots the participants avoided these areas. They were not chosen as exercise developmental goals by the audience or as topics to provide coaching on by the O/C. Thus, project staff make the following recommendation: *Recommendation 3: Future research should investigate the utility of providing additional criteria by which performance related to specific coaching points should be measured.*

The benefits of taking this approach could be significant, and it should be explored, though an immediate concern is the inclusion of too much performance information. An overabundance of information may corner users into an extremely narrow focus. In this case, opportunities to provide valuable coaching on adjacent topics may be missed.

Coaching

During the project, pilot implementations of the prototype exercise allowed developers to refine, test, and develop guidance for the MEDALIST coaching model. It took only a few implementations to solidify the model and document it in the TSP. Project staff, however, did

not test that guidance by requiring users unfamiliar with the development of the model to implement it using the guidance provided. *Recommendation 4: Future research should evaluate the MEDALIST coaching guidance by conducting pilots in which Army personnel fill the position of O/C.* This would bring more objective assurance that the written guidance supports the coaching concept as intended, and may identify improvements that have not to this point been considered.

Simulation

The MPS represents an experimental tool for supporting MEDALIST training exercises. It serves as the simulation for the training by presenting performance cues (i.e., scripted tactical reports and displays) and supporting distributed communication among training participants. During the project, developers evaluated and refined the MPS so that it fully supports the current MEDALIST training approach. Future versions (i.e., those to be developed during the MEDALIST follow-on project) will include a more realistic portrayal of the emerging operating environment and will be used to support further refinement of the MEDALIST training approach. Future versions may also find a broader application as near-term Army training solutions. In the mean time, the MPS has already provided insight into the requirements for FCS design, to include the design of the FCS embedded simulation, called the One Semi-automated Forces (OneSAF) Objective System (OOS).

A Near-term Training Solution

Given its positive reception in the MEDALIST prototype exercise pilots, the MPS appears to represent more than just a model on which future simulations should be developed—it may gain acceptance, itself, as a useful operational training system for use prior to the fielding of the FCS and its OOS. For this to happen, however, the system would have to be fully exportable to its prospective users who have a broad range of computer hardware, software, and network requirements. In addition, future versions of the MPS could also benefit from better integration with other simulation tools supporting future modeling and simulation of ground warfare, command, control, communications, combat support, and combat service support. *Recommendation 5: Future MPS versions should be designed for greater architectural portability and improved performance.*

One approach to implementing this recommendation could include reprogramming the MPS system in Java. The Java language has been designed to enable the development of secure, high performance, and highly robust applications on multiple platforms in heterogeneous, distributed networks. A Java-based implementation of the MPS could provide an architecture-neutral, portable, and dynamically adaptable environment for future development efforts. A Java-based MPS could run on operating systems other than Microsoft Windows 2000. This would make it easier for the system to be implemented as a web-based application running on an independent web server, which, in turn, would reduce the end-user hardware and software requirements. A Java-based MPS could also be used in tandem with other simulation tools such as the OneSAF Testbed Baseline (OTB), the OOS prototype.

Currently, the MEDALIST training approach lacks flexibility in the extent to which tactical scenarios can be modified, both in preparation for training and during training. This is due to the extensive scripting of tactical reports and displays. The integration of the additional simulation capabilities of the OTB, however, could enable users to modify scenario events more easily, allowing commanders to make more decisions during an exercise and train with a more realistic COP. It could also reduce the requirement to develop the multiple exercise versions that are currently needed to portray varying scenarios, and it could provide training that is truly adaptable to the requirements of different users. This is significant in light of the fact that it requires approximately 40 hours to develop a base exercise version and 12 hours to develop each alternate exercise version.

The current MPS is also designed to minimize the personnel support requirements commonly associated with the use of the more comprehensive constructive simulations. These requirements surface in the form of translating simulation data into usable tactical reports during training. With a Java application, it may be possible to link the MPS and simulation to eliminate or minimize this additional support task. The key variable would be the simulation's capability to generate automatically the tactical reports required for the training. If this capability were realized, it would also eliminate or reduce the requirement to script tactical reports during exercise development, leading to a reduction in total development time.

Though the benefits would be substantial, the addition of OTB into MEDALIST training must be executed in consideration of how it may affect the users' ability to accomplish their training objectives. The current MPS-only training model inhibits flexibility, but at the same time enhances the focus on tasks trained due to the virtual removal of the "game" component. Adding OTB would increase flexibility, but would also reintroduce the detracting effects associated with immersing participants in a more realistic mission or game environment. *Recommendation 6: Future versions of the MPS should be designed to integrate OTB, but only to the extent that it increases the value of the training.* Exercises that train higher-level tasks, such as decision-making or planning, and require greater scenario flexibility represent ideal candidates. Alternatively, exercises that focus on basic communication skills and that require minimally flexible scenarios may not benefit substantially from the addition of OTB.

Designing the Future Combat System of Systems

In addition to being potentially useful as a training delivery tool, the MPS has also enabled the MEDALIST project to generate recommendations regarding the development of the FCS and its embedded simulation, OOS. Regarding FCS development, project findings suggest that future Army commanders and leaders will be better prepared than their predecessors are for adapting to and using digital communication tools. *Recommendation 7: The FCS command and control systems should leverage the digital communication methods that their users will already have come to know.* The instant messaging function included in the MPS is a prime example of such communication methods.

Regarding the development of the OOS, the simulation must incorporate the capability to construct realistic scenarios without the support of a large training support contingent. Previous simulation-based training programs have used constructive simulation extensively to generate

realistic training environments (Hoffman et al., 1995; Graves et al., 1997). Doing this, however, has required the participation of numerous roleplayer personnel who were responsible for translating simulation data into usable tactical reports to be delivered to the training audience. Because future training should require the lowest possible level of personnel support, any incorporation of constructive simulation should be executable without this requirement. *Recommendation 8: The OOS must be designed to provide data in the formats and level of detail that reflect how that data would be provided if it had originated from operational command and control sources.*

Integration into Army Training

One of the project's goals was to determine the extent to which the MEDALIST approach would be acceptable and useful in the TRADOC and FORSCOM environments. Overall, the program was found to be acceptable by small samples of Soldiers from both settings. However, the program was adapted to and accepted more readily by the younger Soldiers coming straight out of AOBC. Project staff estimated that this was due, at least in part, to the younger officers' familiarity with technologies such as instant messaging.

If younger Soldiers are more comfortable with the digital communication technologies, such as those used by the MEDALIST training approach, integration of the approach into the TRADOC domain should be initiated with that group of constituents in mind. *Recommendation 9: The MEDALIST training approach should be integrated into TRADOC courses starting with the AOBC, where it may be best received and utilized.* The integration should not be rushed, however, but conducted strategically to obtain the best results. *Recommendation 10: Future research should require developers to team with AOBC instructors and students to determine the best ways to integrate MEDALIST exercises into the AOBC.*

Integrating the approach into FORSCOM training will also require additional research, but may take longer to enact due to the difficulty of integrating new training concepts into established training regimens. Thus, any effort to introduce new training concepts should be attached to key Army-sponsored training development. *Recommendation 11: The MEDALIST training approach may be most effectively integrated into FORSCOM training if it is introduced through future forces training development for the Future Force.*

Future Forces Training

In light of the potential acceptability of the MEDALIST training approach, it is critical that the approach be refined so that it can be viewed by as wide an audience as possible as the Army prepares to design its training for future forces. The MEDALIST follow-on project has this goal as its primary objective and will develop several prototype exercises for future force audiences. Refining the approach will involve exploring the Future Force, or FCS, environment and determining its effects on the training approach. The environment should be examined in terms of force structure, equipment, training support systems, and threat and other battlefield conditions in order to determine how each of these factors affects leader performance requirements, training needs, training conditions, and, eventually, the training approach itself.

In anticipation of the follow-on revision effort, project staff identified two specific recommendations regarding how the approach should be refined. *Recommendation 12: The approach's use of reach intelligence sources should be expanded to include the use of web sites that represent those likely to be available to forces in the future (i.e., 2010).* This should include expanding or supplementing the MPS with information feeds obtained by notional digital intelligence collectors (i.e., sensors) and will add significantly to the degree to which exercises can include realistic performance requirements and conditions. In addition, successful training for future forces will rely on the participation of coaches who are experts in their fields, but who are also well trained as coaches. In the case of MEDALIST training, which employs a unique model of coaching, this aspect takes on an elevated importance. *Recommendation 13: The training approach should incorporate training for coaches.*

The individual recommendations made in this section represent numerous ways in which the MEDALIST training approach could be refined. Together though, they reflect *the need* for continued refinement, both to allow the approach to meet the needs of its future users and to develop a version of the approach that can be demonstrated for the purpose of integrating key training concepts into future forces training.

Summary and Conclusion

This report has described ARI's initial MEDALIST project, covering the project's background, objectives, activities, and outcomes. It represents the final documentation of the project and includes recommendations that can be used to facilitate and guide future research in follow-on and related efforts. This section provides a brief summary of the project and describes the potential of the MEDALIST approach as an appropriate solution for delivering training in the future.

Project Summary

The MEDALIST project was initiated based on the premise that conducting battle command and delivering training will be as difficult and critical as ever in the emerging operational and training environments. This premise was established by exploring the conditions of those environments and identifying a list of relevant training needs. In response to these needs, project designers explored the potential utility of two proven training methods that remain underutilized in Army training: structured training and deliberate practice. The key project objectives reflected the findings of this research and were stated as follows:

- *Objective 1.* Identify a set of small team training requirements associated with effective communication in decentralized battle command in dispersed operations.
- *Objective 2.* Design and develop a multi-echelon, distributed training approach and a sample prototype exercise based on the approach.
- *Objective 3.* Evaluate the training requirements, approach, and exercise through pilot implementation.

Initial project efforts dealt with the first objective, which stipulated the identification of the requirements for training small teams of leaders on communicating in a dispersed and

decentralized battle command environment. To identify these requirements, project staff first examined the functions of battle command to identify the basic communication activities that occur therein (see Figure 1). An additional literature review led to the identification of a set of general guidelines for communicating effectively in decentralized command in dispersed operations (see Figure 2). The training requirements identified were later used to construct a single training objective for the project's prototype exercise, which was developed to demonstrate the MEDALIST training approach.

The MEDALIST training approach was designed to meet the requirement for training that is distributed, realistic, efficient, scalable, adaptable, focused, and flexible, as described earlier in this document. As such, the approach is distributed, enabling groups of Army commanders, leaders, and trainers who are not co-located to train together. Its distributed feature, enabled by the MPS (described on page 16), also provides for a certain realism by allowing participants who *are* co-located to train under simulated dispersed operating conditions (i.e., from different offices or buildings). The approach is also efficient, scalable, and adaptable in its implementation, promoting an effective use of training time and materials. Finally, the approach incorporates focus and flexibility by enabling training on a variety of objectives, tasks, and skills associated with decentralized battle command in dispersed operations.

To demonstrate the MEDALIST training requirements and approach, project staff designed and developed a prototype exercise. The exercise represents only one version of one exercise, but is documented in a TSP design that supports related, though notional, exercises that were not developed during the current project. The exercise demonstrates all the characteristics of the training approach, with the exception of scalability.

During the project, the prototype exercise was implemented six times in order to obtain feedback and identify needed revisions to the training requirements, approach, and exercise. Appropriate feedback and observations, most of which related to the approach's coaching model and MPS, were incorporated into the final product designs. Other feedback and observations related to TSP design and the utilization of the deliberate practice method were documented as project recommendations to be incorporated in future R&D.

The project concluded by presenting a set of recommendations for the conduct of future research. Many of the recommendations represent ideas that can be incorporated or explored in the MEDALIST follow-on project. Others deserve the attention of future R&D that further explores means by which effective training can be provided for future forces. A summary of the project's recommendations is provided in Figure 14.

- Recommendation 1:** Future research should develop and evaluate a framework by which the Multi-Echelon Distributed Army Leaders' Information Support Training (MEDALIST) approach can be implemented in order to train a broader array of objectives.
- Recommendation 2:** Information within the training support package should be redistributed, freeing users who are familiar with the approach from having to handle information that they do not need.
- Recommendation 3:** Future research should investigate the utility of providing additional criteria by which performance related to specific coaching points should be measured.
- Recommendation 4:** Future research should evaluate the MEDALIST coaching guidance by conducting pilots in which Army personnel fill the position of observer/controller.
- Recommendation 5:** Future MEDALIST Prototype System (MPS) versions should be designed for greater architectural portability and improved performance.
- Recommendation 6:** Future versions of the MPS should be designed to integrate One Semi-automated Forces (OneSAF) Testbed Baseline, but only to the extent that it increases the value of the training.
- Recommendation 7:** The Future Combat System of Systems command and control systems should leverage the digital communication methods that their users will already have come to know.
- Recommendation 8:** The OneSAF Objective System must be designed to provide data in the formats and level of detail that reflect how that data would be provided if it had originated from operational command and control sources.
- Recommendation 9:** The MEDALIST training approach should be integrated into U.S. Army Training and Doctrine Command courses starting with the Armor Officer's Basic Course (AOBC), where it may be best received and utilized.
- Recommendation 10:** Future research should require developers to team with AOBC instructors and students to determine the best ways to integrate MEDALIST exercises into the AOBC.
- Recommendation 11:** The MEDALIST training approach may be most effectively integrated into U.S. Army Forces Command training if it is introduced through future forces training development for the Future Force.
- Recommendation 12:** The approach's use of reach intelligence sources should be expanded to include the use of web sites that represent those likely to be available to forces in the future (i.e., 2010).
- Recommendation 13:** The training approach should incorporate training for coaches.

Figure 14. Summary of project recommendations.

Conclusion

As the Army nears its fielding of the Future Force and FCS, it is becoming increasingly important to define the range and methods of training that will be needed to bring that force to proficiency. The outcomes of the MEDALIST project have the potential to assist in these tasks. First, the project identified a set of training requirements that address the communication involved in executing battle command in a dispersed environment. Second, the project developed an approach for training those requirements. The approach is designed to be conducted in a distributed manner and to integrate deliberate practice, to include active, expert coaching, in support of an efficient training experience.

Initial implementations of the approach suggest that it represents an effective means of delivering training. Furthermore, the implementations suggest that the approach will be acceptable to Army users. Based on these findings, these authors conclude that the approach should be refined, expanded, and integrated into the Army's TRADOC courses, starting with the officer basic courses. The approach should then be examined by the developers of FCS training for its potential to assist in the design of training for future forces.

References

- Bailey, M. L., & Luetkehans, L. (1998). *Ten great tips for facilitating virtual learning teams*. Northern Illinois University.
- Bing, C. M. & Laroche, L. (2002). *Communication technologies for Global Teams* (available at <http://www.Itapintl.com/communicationTechnoloites.htm>).
- Bing, J. W. (2001). *Developing a consulting tool to measure process change on Global Teams: The Global Team Process Questionnaire*. ITPA International, Inc.
- Bloom, B. S. (1981). Foreword. In T. Levin, *Effective instruction*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Campbell, C. H., Quinkert, K. A., & Burnside, B. L. (2000). *Training for performance: The structured training approach* (ARI Special Report 45). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- Daly, J. A., Friedrich, G. W., & Vangelisti, A. L. (1990). *Teaching communication: Theory, research, and methods*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Department of the Army, Headquarters. (1999). *Systems approach to training management, processes, and products* (TRADOC Regulation 350-70). Fort Monroe, VA: U.S. Army Training and Doctrine Command.
- Department of the Army, Headquarters. (2001a). *Command and control* (Field Manual 6-0; final draft version). Washington, DC: Author.
- Department of the Army, Headquarters. (2001b). *Operations* (Field Manual 3-0). Washington, DC: Author.
- Department of the Army, Headquarters. (2002a). *Mission training plan for the mounted brigade combat team* (ARTEP-71-3-MTP). Washington, DC: Author.
- Department of the Army, Headquarters. (2002b). *Training the force* (Field Manual 7.0). Washington, DC: Author.
- Department of the Army, Headquarters. (2003). *Mission training plan for the reconnaissance platoon* (ARTEP-17-97F-10-MTP). Washington, DC: Author.
- Dilworth, M. E. (1999). *Effective teaching in distance education*. ERIC Digest 1999-5 Washington DC: ERIC Clearinghouse on Teaching and Teacher Education.

Ericsson, K. A. (1996). The acquisition of expert performance: An introduction to some of the issues. In K. Anders Ericsson (Ed.), *The Road to excellence: The acquisition of expert performance in the arts and sciences, sports, and games* (pp. 1-50). Mahwah, NJ: Lawrence Erlbaum.

Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100, 363-406.

Gossman, J. R., Beebe, M. E., Bonnett, Michael, Forrest, D., Shadrick, S. B., Dannemiller, B., Mauzy, R. P, & Bonnett, Mitch. (1999). *The Commanders' Integrated Training Tool for the Close Combat Tactical Trainer: Design, prototype development, and lessons learned* (ARI Research Report 1739). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Gossman, J. R., Burnside, B. L., Flynn, M. R., Dannemiller, M. A., & Mauzy, R. P. (2002). *Command group training in the Objective Force* (ARI Research Report 1793). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Graves, C. R., Campbell, C. H., Deter, D. E., & Quinkert, K. A. (1997). *Combined arms operations at brigade level, realistically achieved thought simulation I (COBRAS I): Report and development and lessons learned* (ARI Research Report 1719). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Graves, C. R., & Myers, W. E. (1997). *An expansion of the Virtual Training Program: History and lessons learned* (ARI Research Report 1703). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Graves C. R., Brown, S. H., Shadrick, S. B., Heiden, C. G., Jenkins, S. N., Flynn, M. R., & Smith, P. G. (in preparation). *The Multi-Echelon Distributed Army Leaders' Information Support Training (MEDALIST) Prototype System (MPS) and sample exercise* (ARI Research Product). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Hoffman, R. G., Graves, C. R., Koger, M. E., Flynn, M. R., & Sever, R. S. (1995). *Developing the Reserve Component Virtual Training Program: History and lessons learned* (ARI Research Report 1675). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Johnson, S. D., Berrett, J. V., Sumya, C., Yoon, S. W., & LaFleur, J. (2001). *Team Development and Group Processes of Virtual Learning Teams*. University of Illinois.

Jones, T. C. (1996). *Communicating skills necessary for success in a distance environment* (ERIC Digest 399 577). Washington, DC: ERIC Clearinghouse on Teaching and Teacher Education.

Kirkpatrick, D. L. (1994). *Evaluating training programs: The four levels*. San Francisco, CA: Berrett-Koehler Publishers.

Marshall, R. (2001). *Classroom communication apprehension and distance education*. Paper submitted at the Southern States Communication Association Instructional Development Division). Lexington, KY.

Olmstead, J. A. (2002). *Leading groups in stressful times*. Westport, CT: Quorum Books.

Pratt, D. M., Graves, C. R., Campbell, C. H., Detrani, R. L., Leibrecht, B. C., Allen, J. D., et al. (2000). *Operational assessment of Force XXI training products: Lessons for successful fielding* (ARI Research Report 1752). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Shadrick, S. B., & Lussier, J. W. (2002). *Think like a commander captain's edition, prototype 1.0 for the combined arms battle command course* (ARI Research Product 2002-02). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

The Executive Coaching Forum. (2001). *The Executive Coaching Handbook: Principles and Guidelines for a Successful Coaching Partnership*. (available at www.theexecutivecoachingforum.com).

Willis, B. (1992). *Strategies for teaching at a distance* (ERIC Digest 92-8). Washington, DC: ERIC Clearinghouse on Teaching and Teacher Education.

Appendix A

Acronyms

AOBC	Armor Officer's Basic Course
ARI	U.S. Army Research Institute for the Behavioral and Social Sciences
ARTEP	Army Training and Evaluation Plan
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
COP	Common Operating Picture
DA	Department of the Army
FBCB2	Force XXI Battle Command for Brigade and Below
FCS	Future Combat System of Systems
FORSCOM	U.S. Army Forces Command
MEDALIST	Multi-echelon Distributed Army Leaders' Information Support Training
MPS	MEDALIST Prototype System
MTI	Moving Target Indicator
MTP	Mission Training Plan
O/C	Observer/Controller
OneSAF	One Semi-Automated Forces
OOS	OneSAF Objective System
OTB	OneSAF Testbed Baseline
R&D	Research and Development
SALT	Size, Activity, Location, Time
SOP	Standing Operating Procedures
SU	Situational Understanding
TRADOC	U.S. Army Training and Doctrine Command
TSP	Training Support Package

Appendix B

Sample Pilot Evaluation Guide

Pilot Evaluation Guide

Topic 1. Coaching.

1. Describe how coaching materials were used. (*pilot observer; talk to observer/controller*)

- Coaching guide:
- Coaching points:
- Other (e.g., unit standing operating procedures):

2. Document coaching. (*pilot observer*)

Task Step / Coaching Point	Questions Asked	Performance Observed	Direct or Indirect	Audience Reaction

Continue documenting coaching on back of page.

Topic 1. Coaching, *continued*.

3. Describe additional guidance needed to depict how coaching should occur.
(*observer/controller*)

4. Have coach turn in coaching guide with indications of task steps & coaching points addressed. (*Structured Interview Question*)

5. What was the value of making the coaching agreement? (*Structured Interview Question*)

6. How effective was the coaching in helping you improve your performance? (*Structured Interview Question*)

7. What is your opinion of the frequency at which coaching was conducted? (*Structured Interview Question*)

8. What was the value of pausing and repeating portions of the exercise? (*Structured Interview Question*)

9. Can you identify specific areas (task steps or coaching points) in which you improved your performance during the exercise? (*Structured Interview Question*)

10. Based on the number of coaching points or task steps you selected to focus on, how many should you have selected? Was the focus too broad? (*Structured Interview Question, for audience and observer/controller*)

11. Describe how the developmental action plan was handled. (*pilot observer*)

Topic 2. Scenario Materials.

1. Document issues with report/display content and presentation. *(system operator)*
2. How difficult was the tactical scenario/situation? How many decisions did you have to make and how difficult were those decisions? *(Structured Interview Question)*

Topic 3. Simulation.

1. Describe the technical issues involving the simulation. *(pilot observer, observer/controller, assistant observer/controller, system operator)*
2. What are your recommendations for improving the simulation? *(Structured Interview Question)*

Topic 4. Training Materials.

1. Did your training guide provide a clear picture of the training? What was missing that would have helped you prepare for the training? *(Structured Interview Question)*
2. What are your other recommendations for improving the training guides and exercise attachments? *(Structured Interview Question)*

Topic 5. Overall Value.

1. What was the overall value of this training? To you as a Basic Course student? *(Structured Interview Question)*
2. How well would this type of training fit in with the content and structure of the Basic Course? *(Structured Interview Question)*

Topic 6. Assistant Observer/Controller Role.

1. Describe how busy you were during the training. How much time was devoted to (1) roleplaying brigade and (2) controlling the exercise? (*assistant observer/controller*)

2. How effectively could one person, an assistant observer/controller, perform both the assistant observer/controller functions and the system operator functions? (*assistant observer/controller, system operator*)

Topic 7. Training Schedule.

1. Document the times of exercise activities. (*pilot observer*)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.